COMPREHENSIVE EVERGLADES RESTORATION PLAN
WINSBERG FARM WETLANDS RESTORATION

DRAFT INTEGRATED PROJECT IMPLEMENTATION REPORT AND ENVIRONMENTAL ASSESSMENT

February 2008

This Report Contains 2 Volumes

You Are Here

Volume 1 – Main Report

- Abstract
- Executive Summary
- Table of Contents
- Section 1 – Introduction
- Section 2 – Existing Conditions / Affected Environment
- Section 3 – Future Without Project Conditions
- Section 4 – Identification of Problems and Opportunities
- Section 5 – Formulation of Alternative Plans
- Section 6 – The Selected Alternative Plan
- Section 7 – Environmental Effects of the Selected Plan
- Section 8 – Plan Implementation
- Section 9 – Summary of Coordination
- Section 10 – Recommendations
- Section 11 – List of Report Preparers
- Section 12 – Index
- Section 13 – Glossary of Terms
- Section 14 – Acronyms
- Section 15 – References

Volume 2 – Annexes and Appendices

- Annex A – U.S. Fish and Wildlife Service Coordination Act Report and Endangered Species Act Compliance
- Annex B – NEPA Information
- Annex C – Analysis Required by Federal and State Law
- Annex D – Draft Project Operating Manual
- Annex E – Project Monitoring Plan
- Annex F – RECOVER Reports
- Appendix A – Engineering
- Appendix B – Cost Estimates
- Appendix C – Environmental and Cultural Resources Information
- Appendix D – Real Estate
- Appendix E – Agency and Public Information
- Appendix F – Plan Formulation and Evaluation
- Appendix G – Economic and Social Considerations
- Appendix H – Recreation

CENTRAL AND SOUTHERN FLORIDA PROJECT
WINSBERG FARM WETLANDS RESTORATION

DRAFT INTEGRATED
PROJECT IMPLEMENTATION REPORT
AND
ENVIRONMENTAL ASSESSMENT

U.S. ARMY CORPS OF ENGINEERS
JACKSONVILLE DISTRICT

PALM BEACH COUNTY WATER
UTILITIES DEPARTMENT

February 2008

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PRELIMINARY
FINDING OF NO SIGNIFICANT IMPACT
WINSBERG FARM WETLANDS RESTORATION PROJECT
PALM BEACH COUNTY, FLORIDA

I have reviewed the Project Implementation Report (PIR) with the integrated Environmental Assessment (EA) for the proposed action. This Finding incorporates by reference all discussions and conclusions contained in the EA enclosed herewith. Based on information analyzed in the EA, reflecting pertinent information obtained from agencies having jurisdiction by law and/or special expertise, I conclude that the proposed action will not significantly impact the quality of the human environment and does not require an Environmental Impact Statement. The reasons for this conclusion are in the following summary:

a) The proposed project would occur within former agricultural land. Minimal environmental resources exist on this site. A portion of the project has already been constructed and is being successfully operated by the non-federal sponsor. No eligible historic resources are identified within the site.
b) The Draft Fish and Wildlife Coordination Act Report of August 26, 2005 (Annex A of the EA), indicates the support of the Department of the Interior for the selected plan and compliance with the Fish and Wildlife Coordination Act and Endangered Species Act. In 2005, the U.S. Army Corps of Engineers (USACE) submitted a biological assessment (BA) to the U.S. Fish and Wildlife Service (USFWS) with a determination of "may affect; not likely to adversely affect" endangered species (Annex A of the EA). In December 2005 USFWS concurred with the USACE determination. The proposed action is in compliance with the Endangered Species Act.
c) Pending the state's concurrence with the Coastal Zone Consistency (CZC) Determination accompanying the PIR (Annex C of the EA), the action is consistent with the State's Coastal Zone Management (CZM) programs.
d) Consultation with the State Historic Preservation Officer has been completed and no culturally or historically significant sites will be affected (Annex B of the EA).
e) Measures to eliminate, reduce or avoid potential impacts to fish and wildlife resources include the following: (1) Special measures will be incorporated during project construction to minimize effects to any listed species that may be present, including standard protection measures for the eastern indigo snake and Habitat Management Guidelines for the Wood Stork in the Southeast Region. (2) To prevent exposure of residual contaminants to wildlife species, the top six inches of soil will be excavated and used in the construction of tree islands or exterior

ditches/berms. The excavated soil will be capped with a minimum of six inches of soil obtained from a deeper stratum.

f) State water quality requirements will be followed.

g) This is an ecosystem restoration study authorized by the Water Resources Development Act of 2000, which, if approved, would increase the extent of wetlands and wildlife habitat in the greater Everglades.

_____ _____

Paul Grosskruger Date
Colonel, U.S. Army
District Engineer

COMPREHENSIVE EVERGLADES RESTORATION PLAN
WINSBERG FARM WETLANDS RESTORATION PROJECT
(ALSO KNOWN AS GREEN CAY WETLANDS)
DRAFT INTEGRATED PROJECT IMPLEMENTATION REPORT
AND ENVIRONMENTAL ASSESSMENT

*ABSTRACT

Lead Agency: The lead agency is the U.S. Army Corps of Engineers, Jacksonville District. The Palm Beach County Water Utilities District (PBWUD) is the non-federal partner. This is a Comprehensive Everglades Restoration Plan (CERP) project.

Abstract: This Integrated Draft Project Implementation Report and Environmental Assessment (PIR/EA) documents the selection and recommendation, after public and agency coordination of the Draft PIR/EA of Alternative 1 as the preferred plan for the construction of the Winsberg Farm Wetlands in Palm Beach County, Florida. The recommended plan would hydrate a total of about 114 acres (including internal and external berms and embankments) of farmland previously owned by the Winsberg family. Prior to being farmed, project lands were wetlands. The project would create a wetland located on about 175 acres of former farmland just east of the Southern Region Water Reclamation Facility (SRWRF). Of the 175 acres, about 114 acres of the site would be hydrated using treated wastewater from the SRWRF. Educational/Recreational features will also be included. In order to fulfill a condition of the real estate sales agreement between the local sponsor and the seller, Phase 1 of the recommended plan has already been constructed by the PBWUD and is currently operating. The Phase 1 facility is referred to as the Green Cay Wetlands by PBWUD.

Expected project benefits include creation of wetland habitat for wildlife, including some threatened and endangered species, return of water to the surficial aquifer and natural system rather than loss to deep-well injection, improved aquifer recharge, and increased spatial extent of wetlands. The approximate total cost for this ecosystem restoration project is $19,135,351, including Phase 1 and Phase 2.

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CENTRAL AND SOUTHERN FLORIDA PROJECT
WINSBERG FARM WETLANDS RESTORATION PROJECT

DRAFT
INTEGRATED PROJECT IMPLEMENTATION REPORT
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*EXECUTIVE SUMMARY

PURPOSE AND NEED FOR THE STUDY

The tentatively selective plan (TSP) described in this Project Implementation Report is the environmentally preferred alternative in accordance with the National Environmental Policy Act (NEPA). This plan includes creation of about 114 acres of wetlands in western Palm Beach County, Florida, on agricultural lands now owned by Palm Beach County. **Figure E-1** shows the general location in aerial view of the Winsberg Farms Wetlands Restoration study site. **Figure E-2** displays an aerial view of the TSP with descriptions of components. The wetlands will use treated wastewater from the County's Southern Regional Wastewater Reuse Facility (SRWRF) located on Hagen Road.

The Winsberg Farm project presents a unique opportunity to create a wetland habitat for fish and wildlife on agricultural lands in an urbanized area of Palm Beach County, Florida. In addition, since the project uses treated wastewater, this water, which was previously injected into a confining layer of the aquifer via deep wells can now be returned to the surficial aquifer and made available for the natural system. The Winsberg Farm site is located in the vicinity (west of) Boynton Beach in Palm Beach County, Florida, between Jog Road on the east and Hagen Road on the west. The Lake Worth Drainage District's L-29 Canal is the northern boundary and the L-30 Canal is the southern boundary of the project site. To comply with a condition of the real estate purchase agreement, the non-federal sponsor, Palm Beach Water Utilities District (PBWUD), has already constructed a portion of the project on the western part of the site that constitutes Phase 1 of the recommended plan. PBWUD has named this portion Green Cay Wetlands. This report presents the results of intensive problem identification, modeling and alternatives analysis. A multi-agency, interdisciplinary team evaluated alternative plans consisting of various combinations of components and operating plans. Alternative 1, the TSP, is recommended for implementation.

Figure E-1 shows the general location in aerial view of the Winsberg Farms Wetlands Restoration study site.

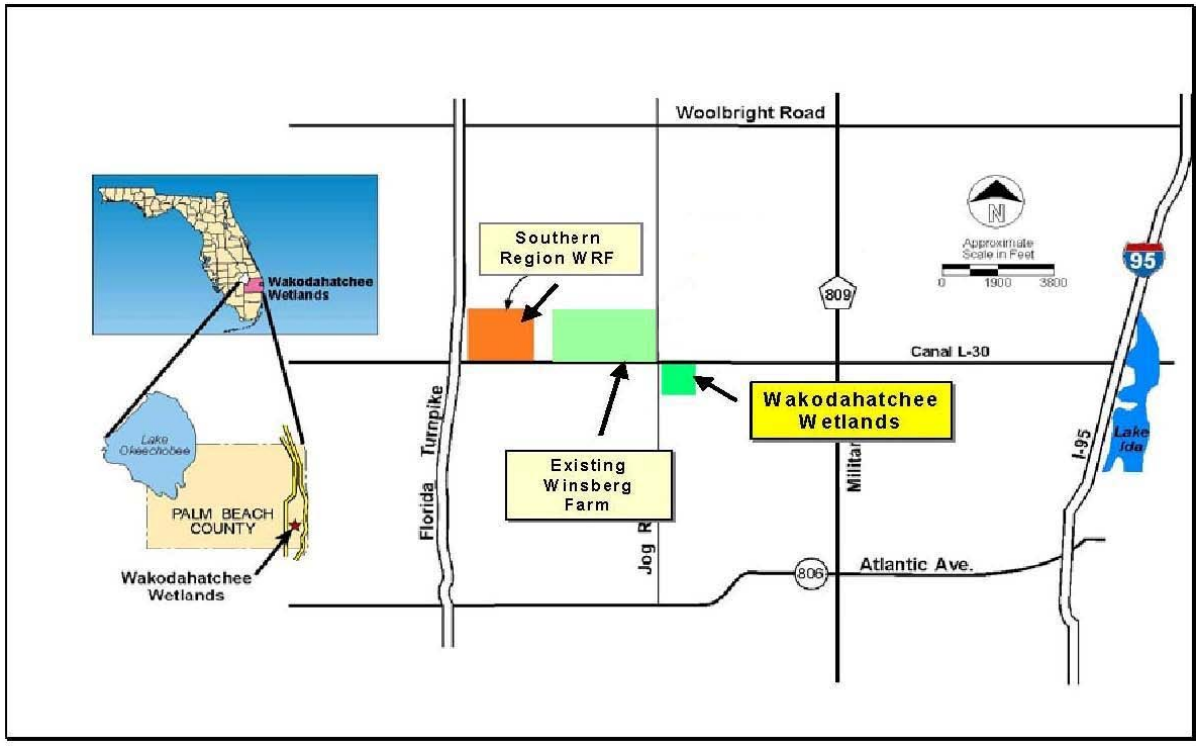

FIGURE E-1: GENERAL LOCATION OF THE PROJECT STUDY AREA

Figure E-2, on the next page, displays an aerial view of the TSP with descriptions of components.

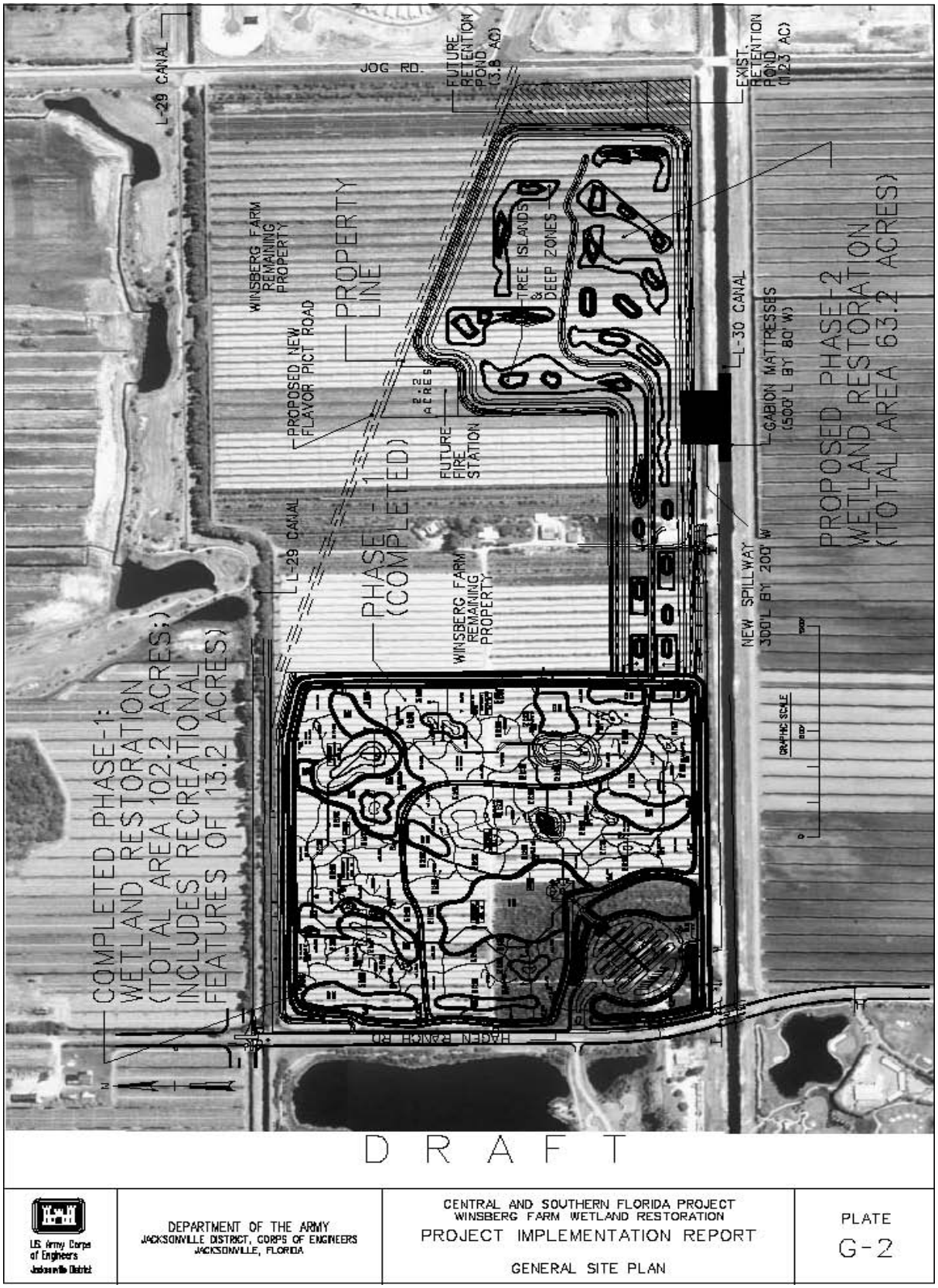

FIGURE E-2 WINSBERG FARM TSP

Relationship of the CERP and the Winsberg Farm Wetlands Restoration Project

In Section 601 of the Water Resources Development Act of 2000 (WRDA 2000) (PL 106-541), Congress approved the Central and Southern Florida (C&SF) Project Comprehensive Review Study Integrated Feasibility Report and Programmatic Environmental Impact Statement (aka "The Restudy"). The Comprehensive Everglades Restoration Plan (CERP) contained in that report was approved as a framework for modifications and operational changes to the Central and Southern Florida(C&SF) Project that are needed to create, preserve and protect the South Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection. The CERP includes 68 components that, once implemented, will work together to achieve the purposes of the Plan. These 68 components include several components referred to as Other Project Elements (OPEs) that were not initially formulated at a level of detail commensurate with other CERP components, but were collectively viewed as important steps toward realizing regional ecosystem restoration benefits. The Winsberg Farm Project is one of these OPEs.

While Section 601 of WRDA 2000 approved the CERP as a framework for the restoration of the South Florida ecosystem, it only initially authorized a small number of projects. Many of the projects within the CERP must be individually authorized by Congress. However, WRDA 2000 did contain language directing that the Secretary of the Army may authorize smaller CERP projects, including Winsberg Farm, under the Programmatic Authority without additional congressional authorization.

Due to its size and complexity, the CERP is being implemented as a series of projects. In accordance with the requirements of WRDA 2000, each project is studied in a finer level of detail than was possible in the Restudy. These detailed studies are referred to as Project Implementation Reports (PIRs), which must be completed and approved prior to implementation of a CERP project. The PIR is similar to a traditional feasibility report, which addresses the project's economic and environmental benefits, engineering feasibility, and plan formulation and evaluation. Additional unique requirements for CERP PIRs include evaluating project effects on sources of water and flood protection, and identifying quantities of water made available to be reserved or allocated for the natural system and made available for other water-related needs of the South Florida region.

Alternatives Evaluated

Based on the initial plan formulation conducted as part of the Restudy effort, this Draft PIR reaffirms that constructing a wetland for fish and wildlife habitat

at the Winsberg site is cost effective and that none of the conditions affecting project purposes and need have changed substantially from those at the time of the Comprehensive Review Study. A detailed discussion of the reaffirmation analysis of the Winsberg Farm project originally described in the 1999 Comprehensive Review Study (Restudy) Report (a.k.a. "Yellow Book") is contained in Section F.3 of **Appendix F** (Plan Formulation) of this Draft PIR. For this PIR, plan formulation was conducted for the entire project, which is to be implemented in two phases (Phase 1 and Phase 2), since the non-federal sponsor has already constructed and is successfully operating a portion of the project. The plan formulation process involved comparing three wetland designs (including variations in structures and operations) in order to identify an alternative that optimizes the ecological benefits of a wetland on the Winsberg site. The primary difference between the three alternatives was the proposed hydroperiod (i.e., depth and duration of standing water) on the site, which exerts significant influence over the growth and distribution of plant species and fish and wildlife utilization within the wetland.

Alternative 1:	114-acre wetland using an intermediate hydroperiod.
Alternative 2:	114-acre wetland using a short hydroperiod.
Alternative 3:	114-acre wetland using a long hydroperiod

Findings and Conclusions

All alternatives except the No-Action Alternative would result in creation of additional wetlands and fish and wildlife habitat and would re-use treated wastewater by returning it to the natural system. The intermediate hydroperiod wetland (Alternative 1, the TSP) would provide optimal conditions for wetland habitat development. It would also use more wastewater than the short hydroperiod design (Alternative 2) and would have a lower construction cost than would be associated with the construction of more deep zones in the long hydroperiod design (Alternative 3).

Tentatively Selected Plan

The recommended alternative plan (Alternative 1) for this wetland restoration project is located on about 175 acres of former farmland just east of the SRWRF. About 114 acres of the site would be hydrated using treated SRWRF wastewater. The proposed concept would result in creation of a wetland system about three times the size of the nearby Wakodahatchee Wetlands project, an already completed wetland creation project utilizing treated wastewater. Winsberg Farm is in close proximity to the Wakodahatchee site and would leverage the recently created ecosystem restoration benefits there by expanding the spatial extent of wetlands in the study area to create an integrated wetland and fish and wildlife habitat system having greater regional significance. The TSP will

create 114 acres of wetland habitat on lands previously used for agriculture and will provide benefits for many species of wildlife including some threatened and endangered species. In addition, the project will provide new source of water beneficial to the natural system by treating and percolating approximately 5 million gallons per day of treated wastewater that was previously lost from the regional water management system through deep-well injection.

The recommended alternative includes a Phase 1 design and construction (already completed by the non-federal sponsor), which includes about 72 acres of wetlands created in the western half of the project. The remaining 42 acres of the project area on the east half of the Winsberg Farm property would constitute Phase 2 of the project and would contain the same habitat types as Phase 1. The recommended plan is configured assuming constant inflow of water to maintain continuous inundation. Inflow from the SRWRF facility enters the western half of the project (Phase 1). The western half of the project is divided by an internal levee, which creates a Cell 1 to the north and a Cell 2 to the south. Water-levels in each cell can be independently managed by operation of inflow gate valves and butterfly valves and outflow at control structures. Each cell has a gated control structure with a 24-inch RCP culvert.

The control structure can be operated to allow flow:

1. To the eastern half of the project (Phase 2);
2. To circulate in the western half of the project with a 15-HP recirculation pump; or
3. In the event pool elevations rise beyond a set point due to direct rainfall, flows can be directed to deep-well injection via a 250-HP discharge pump

Phase 2 of the project will be constructed and operated consistent with the design principles and operational rules utilized to successfully construct and operate the Wakodahatchee project and Phase 1 of this project.

Water for the Natural System and Other Water-Related Needs

Approximately five million gallons per day (5 MGD) of treated wastewater will be delivered to the project site. All of this water will initially be made available for fish and wildlife habitat. Approximately 75 percent of the water delivered to the project will remain within the wetland, evaporate, or be taken up through transpiration. The remaining 25 percent of the water will percolate into the surficial aquifer, which will then be available for consumptive use and to protect the aquifer from salt water intrusion.

The Savings Clause

Since the source of water to be delivered to the project site is treated wastewater that is currently injected into a non-potable aquifer, no existing legal sources of water will be eliminated or transferred as a result of project implementation.

With respect to effects on the level of service for flood protection, the project not expected to cause significant or adverse impacts to any system outside its local aquifer system. The average daily flow to the project site on an annual basis is estimated to be approximately 5 MGD per day (approximately 7.7 cubic feet per second), most of which will be contained on the project site or taken up through evaporation or transpiration.

Project Costs and Cost Apportionment

The total initial estimated cost of the project, including all costs for construction, lands, easements, relocations, rights-of-way and disposals (LERRD), and pre-construction engineering and design (PED) efforts and construction management costs is approximately $19,135,000 (see Table E-1). This amount includes approximately $4,500,000 for recreation features, the cost for which were apportioned primarily to the non-federal sponsor in accordance with USACE policy. The federal share of the total project cost is estimated to be approximately $7,509,434. The non-federal share is estimated to be approximately $11,625,917.

TABLE E-1: ESTIMATE COSTS AND COST APPORTIONMENT

Work Phase	Total	USACE	PBCWMD
PMP	$59,620	$29,810	$29,810
PIR	$2,298,203	$1,149,102	$1,149,102
P&S	$850,000	$425,000	$425,000
Real Estate	$2,647,774	$57,000	$2,590,774
Construction 1A (Boardwalk, ,Interpretive Center, Parking Lot -- Phase 1)	$4,508,149	$1,462,720	$3,045,429
Construction 1B (Wetlands Phase 1)	$3,988,604	$1,994,302	$1,994,302
Construction 2 (Wetlands Phase 2)	$4,783,000	$2,391,500	$2,391,500
Total Cost/Partner		$7,509,434	$11,625,917
Total Cost of Project	$19,135,351		

Stakeholder Perspectives

Palm Beach County Water Utilities District has already constructed the first phase of the project, which has been operating since mid-2005. The local citizens are using the nature center and the boardwalk through the wetland in large numbers. They are very pleased with the wildlife education and viewing

opportunities provided by the project. The US Fish and Wildlife Service, Environmental Protection Agency, and the Florida Department of Environmental Protection fully support the project.

Environmental Operating Principles

The proposed project is consistent with the USACE "Environmental Operating Principles" (http://www.hq.usace.army.mil/cepa/envprinciples.htm), particularly with respect to the south Florida ecosystem-wide approach for plan formulation, evaluation, and selection, and a holistic consideration of water resources needs and solutions to water resources problems in the study area. The TSP incorporates monitoring, and there is an adaptive assessment and management program in place to ensure that CERP projects, including the Winsberg Farm project, are achieving intended purposes from a system-wide perspective. Project implementation, including plan formulation, involved collaborative interactions with the multiple agencies represented on the Project Delivery Team (PDT). Study area stakeholder groups and members of the general public have had multiple opportunities to receive information on the project and to provide comments and recommendations via public meetings, internet postings, teleconferences, and interagency PDT meetings.

Independent Technical Review

An Independent Technical Review (ITR) is a critical examination by a qualified person or team, predominantly within the Corps of Engineers (Corps), which was not involved in the day-to-day technical work that supports a decision document. ITR is intended to confirm that such work was done in accordance with clearly established professional principles, practices, codes and criteria informed by Engineering Regulation (ER) 1105-2-100. An ITR of the draft PIR was conducted by an independent team, consisting of Corps of Engineer reviewers from 5 different offices external to the Jacksonville District. This review was completed on August 24, 2007. All concerns resulting from this review were considered and were addressed in this draft or will be addressed during the preparation of the Final PIR/EA.

Peer Review

External Peer Review (EPR) is in addition to ITR and is added to the Corps existing review process in special cases where the risk and magnitude of the proposed project are such that a critical examination by a qualified person or team outside of the Corps and not involved in the day-to-day production of a technical product is necessary. EPR will similarly be added in cases where information is based on novel methods, presents complex challenges for interpretation, contains precedent-setting methods or modes, presents

conclusions that are likely to change prevailing practices, or is likely to affect policy decisions that have a significant impact. In the absence of a technical requirement high project cost, by itself, may necessitate EPR. For this project, it is being proposed that EPR is not necessary.

Unresolved Issues

Pursuant to a condition of the real estate purchase agreement between the original property owner (Winsberg family) and the non-federal sponsor (Palm Beach County Water Utilities District), Phase 1, including recreation features, of the recommended plan for this project has already been constructed by PBCUWD without federal funds (see Table E-1). Construction was completed prior to the execution of a Project Cooperation Agreement by the U.S. Army Corps of Engineers and PBCWUD. Credit and appropriate reimbursement for costs already incurred, and federal funding, cost-sharing, and crediting for work to be performed by PBCWUD for Phase 2 remain as significant concerns for the non-federal sponsor.

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TABLE OF CONTENTS

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

* Elements marked with an asterisk (*) are required for NEPA compliance according to CEQ Regulations.

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SECTION 1
INTRODUCTION

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1.0 SECTION 1 -- INTRODUCTION

1.1 GENERAL INTRODUCTION

This study and project is a component of the multi-agency program to restore the South Florida Everglades ecosystem. The purpose of this study is to identify a plan that would increase the total area of wetlands and wildlife habitat in eastern Palm Beach County and the greater Everglades system and to increase the amount of water in the natural system. The Winsberg Farm study area encompasses approximately four square miles containing a mixture of farmland and residential development in the eastern part of the county. The source of water for the Winsberg Farm project is the Palm Beach County Southern Region Water Reclamation Facility (SRWRF), which currently disposes wastewater into the Floridan aquifer via deep-injection wells. This wastewater that has been unavailable for the natural system represents a readily available source of new water to hydrate wetlands and support wildlife habitat.

1.2 REPORT AUTHORITY

In Section 601 of the Water Resources Development Act (WRDA) of 2000 (PL 106-541), Congress approved the Central and Southern Florida (C&SF) Project Comprehensive Review Study Integrated Feasibility Report and Programmatic Environmental Impact Statement as a framework for modifications and operational changes to the Central and Southern Florida Project that are needed to create, preserve and protect the South Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection. This framework is known as the Comprehensive Everglades Restoration Plan (CERP) and is documented and described in the "Central and Southern Florida Project Comprehensive Review Study" report prepared in 1999 by the U. S. Army Corps of Engineers, Jacksonville District, and the State of Florida's South Florida Water Management District. This report is commonly referred to as the "Yellow Book". The Plan contained in that report includes 68 components (many of which have been grouped into projects) that, once implemented, will work together to achieve the overall purposes of the Plan. These Plan included several components referred to as Other Project Elements (OPEs) that were not initially formulated at a level of detail commensurate with other CERP components, but were collectively viewed as important steps toward realizing regional ecosystem restoration benefits. The Winsberg Farm Project is one of these OPEs.

While Section 601 of WRDA 2000 approved the Plan as a framework, only 10 projects were specifically authorized for implementation. Most CERP projects must still be individually authorized by Congress. However, the Secretary of the Army may authorize smaller CERP projects, including Winsberg Farm, under the programmatic authority without additional congressional authorization. The

following excerpt from Section 601 of WRDA 2000 is the programmatic authority:

(c) ADDITIONAL PROGRAM AUTHORITY-

(1) IN GENERAL- To expedite implementation of the Plan, the Secretary may implement modifications to the Central and Southern Florida Project that--

(A) are described in the Plan; and

(B) will produce a substantial benefit to the restoration, preservation and protection of the South Florida ecosystem.

(2) PROJECT IMPLEMENTATION REPORTS- Before implementation of any project feature authorized under this subsection, the Secretary shall review and approve for the project feature a project implementation report prepared in accordance with subsections (f) and (h).

(3) FUNDING-

(A) INDIVIDUAL PROJECT FUNDING-

(i) FEDERAL COST- The total Federal cost of each project Carried out under this subsection shall not exceed $12,500,000.

(ii) OVERALL COST- The total cost of each project carried out under this subsection shall not exceed $25,000,000.

(B) AGGREGATE COST- The total cost of all projects carried out under this subsection shall not exceed $206,000,000, with an estimated Federal cost of $103,000,000 and an estimated non-Federal cost of $103,000,000.

Since the overall project cost for the Winsberg Farm project is under $25 million, and the federal cost-share is less than $12.5 million, this project implementation report (PIR) is prepared in response to this programmatic authority, and contains the necessary information and documentation for approval in accordance with the provisions of WRDA 2000.

1.3 PURPOSE AND SCOPE

The overarching objectives of CERP are the restoration, preservation and protection of the South Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection. The Plan is also being implemented to ensure protection of water quality and reduction of freshwater loss, the improvement of the South Florida ecosystem environment, and to achieve benefits to the natural system and human environment. The 68 components of CERP were formulated so that the plan as a whole would achieve these objectives.

Chapter 9 of the Yellow Book describes the objectives and features of each of the 68 components. The description for Winsberg Farm is as follows:

"9.1.8.5 Winsberg Farms Wetland Restoration (OPE)

This feature includes the construction of a 175-acre wetland east of Loxahatchee Wildlife Preserve in Palm Beach County. The feature will reduce the amount of treated water from the Southern Region Water Reclamation Facility wasted in deep injection wells by further treating and recycling the water The purpose of this facility is to create a wetland from water, which would be normally lost to deep well injection and any future beneficial use. The wetland will reuse a valuable resource, recharge the local aquifer system, create a new ecologically significant wildlife habitat and extend the function of the nearby Wakodahatchee Wetland." (Yellow Book, Page 9-15)

1.4 PRIOR STUDIES, REPORTS AND PROJECTS

1.4.1 CERP

The Winsberg Farm Wetlands Restoration Project, also referred to as the Green Cay Wetlands by the local sponsor, is included in the 1999 Central and Southern Florida (C&SF) Project Comprehensive Review Study Report, also known as the Restudy Report. The Comprehensive Review Study was initially authorized by Section 309(l) of the Water Resources Development Act of 1992 (Public Law 102-580), which states:

"(1) CENTRAL AND SOUTHERN FLORIDA. — The Chief of Engineers shall review the report of the Chief of Engineers on central and southern Florida, published as House Document 643; 80th Congress, 2nd Session, and other pertinent reports with a view to determining whether modifications to the existing project are advisable at the present time due to significant changes in physical, biological, demographic, or economic conditions, with particular reference to modifying the project or its operation for improving the quality of the environment, and improving the integrity, capability, and conservation of urban water supplies affected by the project or its operation."

The C&SF Project Comprehensive Review Study is also authorized by two resolutions by the Committee on Transportation and Infrastructure, United States House of Representatives, dated September 24, 1992.

The Water Resources Development Act of 1996, Section 528 (Public Law 104-303), entitled "Everglades and South Florida Ecosystem Restoration" authorized several ecosystem restoration activities and also provided further specific direction and guidance for the C&SF Project and comprehensive review planning efforts.

(b) RESTORATION ACTIVITIES. –

(1) COMPREHENSIVE PLAN. –

(A) DEVELOPMENT. –

(i) PURPOSE.- The Secretary shall develop, as expeditiously as practicable, a proposed comprehensive plan for the purpose of restoring, preserving, and protecting the South Florida ecosystem. The comprehensive plan shall provide for the protection of water quality in and the reduction of the loss of fresh water from, the Everglades. The comprehensive plans shall include such features as are necessary to provide for the water-related needs of the region, including flood control, the enhancement of water supplies, and other objectives served by the Central and Southern Florida Project.

The product of the Comprehensive Review Study is the C&SF Project Comprehensive Review Study Integrated Feasibility Report and Programmatic Environmental Impact Statement, and is often called the "Yellow Book". The recommended plan described in the April 1999 report was designated by Section 601 of WRDA 2000 as the Comprehensive Everglades Restoration Plan CERP.

1.4.2 Critical Projects

Section 528 of the Water Resources Development Act (WRDA) of 1996 (Public Law 104-303) also authorized the Secretary of the Army to expeditiously implement restoration projects that were deemed critical to the restoration of the South Florida ecosystem. In pertinent part the Act reads:

(b) RESTORATION ACTIVITIES. –

(3) CRITICAL RESTORATION PROJECTS. –

(A) IN GENERAL. – In addition to the activities described in paragraphs (1) and (2), if the Secretary, in cooperation with the non-Federal project sponsor and the Task Force, determines that a restoration project for the South Florida ecosystem will produce independent, immediate, and substantial restoration, preservation, and protection benefits, and will be generally consistent with the conceptual framework described in paragraph (1)(A)(ii)(II), the Secretary shall proceed expeditiously with the implementation of the restoration project.

The Critical Restoration Projects Program was authorized under Section 528, with projects referred to as Critical Projects. This authority allows the U.S. Army Corps of Engineers (USACE) to expeditiously implement projects that provided immediate and substantial benefits to the ecosystem in advance of

completion of the Central and Southern Florida Project Comprehensive Review Study (the Restudy). The South Florida Ecosystem Restoration Task Force Working Group (Working Group) completed a review of more than 100 potential candidate restoration projects through extensive coordination. The Working Group recommended and prioritized 35 candidate Critical Projects for implementation, including the Winsberg Farm Wetlands Project.

During the Restudy planning process, it was recognized that the cumulative cost estimate for the Critical Projects exceeded the WRDA 1996 mandated limit. Therefore, it was anticipated that only a fraction of the projects prioritized by the Task Force and Working Group would actually be implemented under the Critical Project authority. To ensure that all of the other Critical Projects received full consideration as part of a comprehensive plan to restore the South Florida ecosystem, the Restudy included those Critical Projects that were not to be implemented under the Critical Projects authority. Many Critical Projects, including Winsberg Farm, were designated as "Other Project Elements" in the Comprehensive Review Study report, since they were not initially formulated at a level of detail commensurate with other CERP components. The Restudy addressed all of the Critical Projects nominated by the Working Group in an effort to ensure they would be implemented.

1.4.3 Non-Federal Studies

The Lower East Coast Plan

The purpose of the Lower East Coast Regional Water Supply Plan (LEC 2020 Plan) is to provide a cost-effective and implementable strategy for assuring that adequate water supplies are available to meet the demands of natural systems, agriculture and urban areas within the planning area through the year 2020. The plan identifies eight water-source options to provide additional water. One of the eight options is reclaimed water. Objective 1 of the Winsberg Farm Wetlands Restoration Project is to "*increase local water-resource availability for natural systems and other uses.*" This will be done using reclaimed wastewater. Therefore, the Winsberg Farm Project is consistent with the goals and objectives of the LEC Plan.

1.5 PROJECT AREA

This study focuses on an area within about three miles of the Palm Beach County Water Utility District's (PBCWUD) SRWRF (see **Figure 1-1**). The SRWRF is bounded by the Florida Turnpike on the west, Lake Worth Drainage District Canal Lateral 30 on the south, Hagen Ranch Road on the east, and Lake Worth Drainage District Canal Lateral 29 on the north.

The Winsberg family approached Palm Beach County with an interest in selling a portion of their Winsberg Farm property to the county to support wetland creation. The Winsberg Farm site is bordered by Hagen Ranch Road to the west, Jog Road to the east, and on the north and south, respectively, by the L-29 and L-30 Conveyance Canals. The location of Winsberg Farm is shown with respect to the SRWRF and Wakodahatchee Wetland sites in **Figure 1-1**.

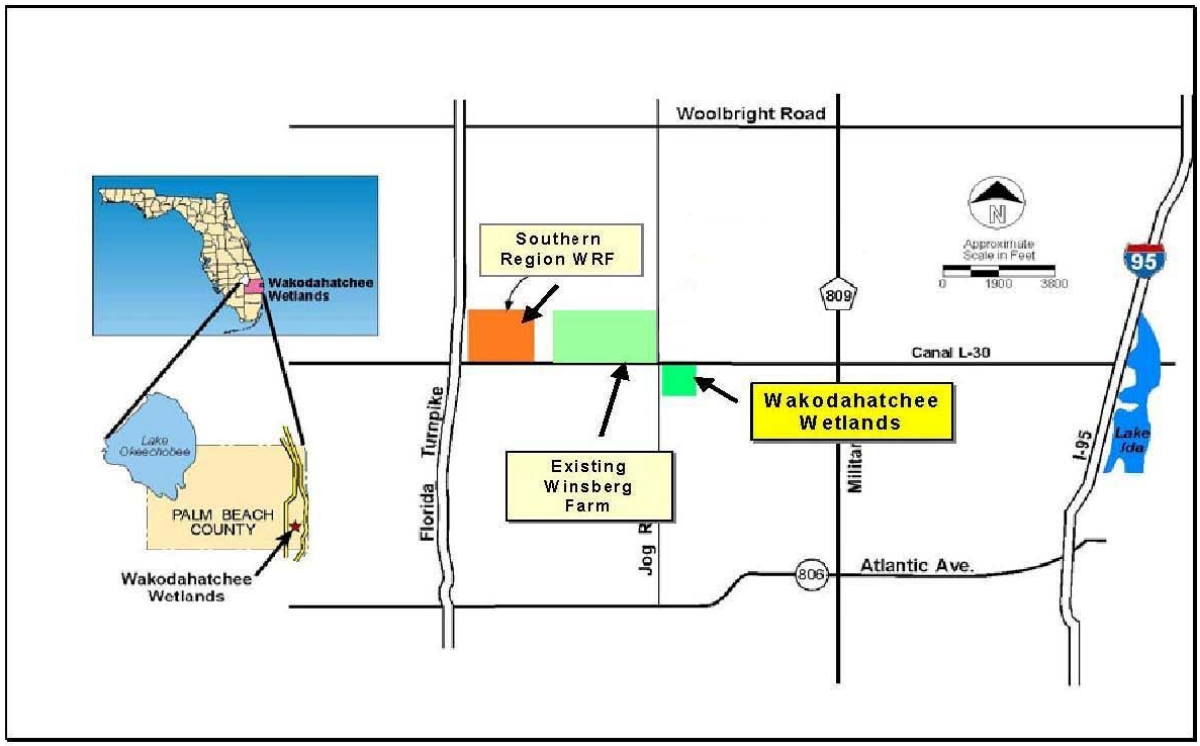

FIGURE 1-1: PROJECT LOCATION MAP

The overall study area encompasses a major portion of southeastern Palm Beach County immediately east of the East Coast Protective Levee (ECPL). The ECPL separates the remaining Everglades to the west, including the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge) from the urbanized and agriculturally developed lands to the east. Prior to development, these lands were part of the short-hydroperiod wetland system that existed along the eastern Everglades where it abutted the coastal ridge. The level of development in the area is essentially non-reversible. However, there are remaining patches of natural wetlands within the study area, and CERP activities are focused on preserving, enhancing or restoring wetlands and other natural-area habitats where possible. Creation of greenways connecting functional wetlands and upland habitat is an objective of Palm Beach County's Department of Environmental Resources Management, as well as state and federal natural resource management agencies.

PBCWUD owns and operates a variety of water and wastewater management systems throughout the urbanized portion of the county. One of its major facilities is the Southern Regional Wastewater Reuse Facility (SRWRF) located in Delray Beach. The service area of the SRWRF is shown in **Figure 1-2**. It covers an area of 90 square miles and extends from the Hillsboro Canal on the south to Hypoluxo Road on the north. The western margins extend in some areas as far west as the ECPL and on the east half way to the Intracoastal Waterway. Land use in this portion of Palm Beach County is dominated by low- to high-density residential areas and agricultural lands. Agricultural lands and remaining open spaces are rapidly being replaced by residential and commercial development.

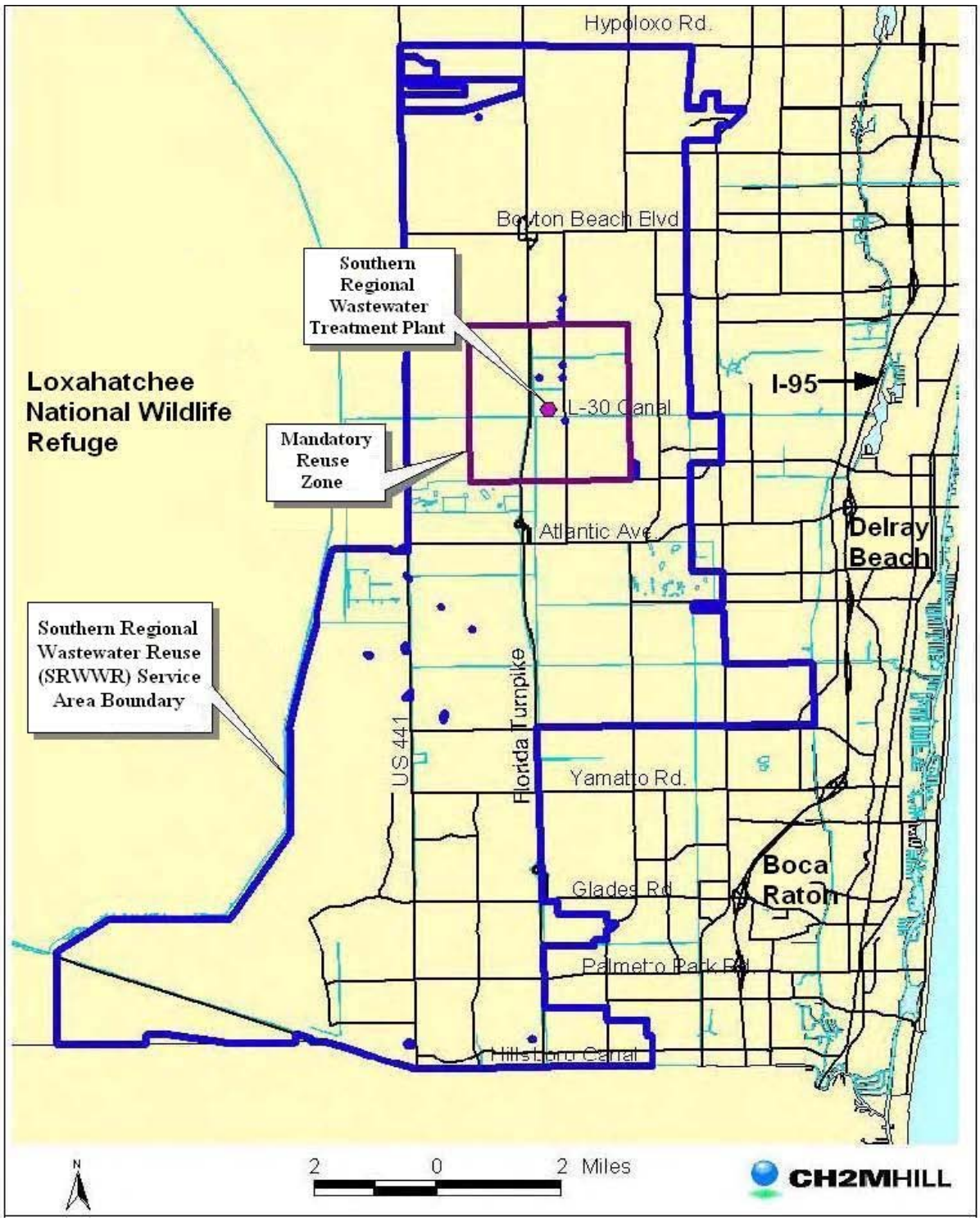

FIGURE 1-2: STUDY AREA

Within the service area there is a mandatory reuse zone that encompasses approximately 6.5 square miles centered around the SRWRF. One award-winning reuse project that PBCWUD has implemented within this zone is the Wakodahatchee Wetlands Project. This project was designed and constructed by

the county during the early 1990s and was completed in November 1996. The project used about 50 acres of former effluent percolation ponds which were converted into a series of wetland cells vegetated with native plant species. The mosaic of wetland habitats designed into the Wakodahatchee Wetlands supports a diverse wildlife assemblage of resident and migratory birds, fish, amphibians and reptiles, as well as several species of mammals. The design included a boardwalk and interpretive signage that promotes public education and passive recreational uses. More than 150 different species of birds have been observed using this constructed wetland, and the site has become an important bird watching spot for South Florida residents and visitors. Views of the Wakodahatchee Wetlands are shown in **Figures 1-3** and **1-4**.

FIGURE 1-3: REPRESENTATIVE VIEW OF THE WAKODAHATCHEE WETLANDS SITE PHOTO 1

FIGURE 1-4: REPRESENTATIVE VIEW OF THE WAKODAHATCHEE WETLANDS SITE PHOTO 2

The Wakodahatchee Wetlands provide many benefits to the community, including:

- Creation of diverse, productive native emergent marsh, hardwood swamp, tropical hardwood hammock, and pine flatwoods habitat;
- Conservation of regional native wildlife populations in a secure, productive and high-quality habitat of native plant species;
- Unique facilities for passive recreation, including bird watching, hiking nature photography, and environmental education;
- Recharge of local surficial aquifers by recycling treated wastewater; and
- Preservation of green space in a densely populated and rapidly developing region.

Based on the well-documented and recognized benefits of the Wakodahatchee Wetlands, PBCWUD studied the feasibility of converting additional lands into similar facilities. These constructed wetlands would provide the regional hydrologic benefits of increased reuse while also increasing the spatial extent of wetlands or associated uplands having regional ecosystem restoration value. These goals are consistent with those of CERP. The opportunity to develop such a project evolved during the development of a sub-regional water-supply-plan and subsequent discussions with the owners of Winsberg Farm.

The proposed wetland creation project would be located on about 175 acres of farmland just east of the SRWRF (see **Figure 1-1**). After subtracting acreage for various uses such as a fire station, a parking lot, and a nature center, the project footprint would be approximately 168 acres in size, with 150 acres of wetlands, interior berms and embankments. Of those 150 acres, approximately 114 acres would be wetlands hydrated by using treated wastewater from the SRWRF. The proposed project would result in creation of a wetland system about three times the size of the Wakodahatchee Wetlands, and its close proximity to the Wakodahatchee site would leverage the recently created ecosystem restoration benefits by expanding the constructed wetlands into an integrated system having greater regional significance.

Winsberg Farm Wetlands Restoration Acreage Breakdown:

- 175.0 total acres purchased
- 7.2 acres – Future fire station, future and existing retention ponds
- 167.80 acres – Total project footprint
    - 19.20 acres – Nature Center, parking lot, access/perimeter maintenance roads, other
    - 148.6 acres – Wetlands and interior berms and exterior embankments.
        - 34.5 acres – Interior berms and exterior embankments
        - 114.1 acres – hydrated wetlands

- Wetlands Phase 1 – 71.6 (72) acres
- Wetlands Phase 2 – 42.5 (42) acres

The county developed conceptual plans and consulted with state regulatory agency representatives to further develop preliminary engineering designs and operational concepts for the wastewater reuse/wetlands creation project. In 1999, at the time the Comprehensive Review Study of the Central and Southern Florida Project report was submitted to Congress for review, the concept of Winsberg Farm restoration had sufficient merit to be included in that report as an OPE project.

Planning goals for the Comprehensive Review Study included increasing the area of wetlands, and increasing water availability and wildlife abundance. The LEC Regional Water Supply Plan (LEC Plan) also calls for increasing water availability and other related goals. Many LEC Plan proposals were incorporated into CERP. Palm Beach County's goal to construct wetlands using water from the SRWRF is entirely compatible and consistent with CERP and the LEC Plan.

In consideration of the goals and objectives of the ongoing Comprehensive Review Study and LEC Water Supply planning efforts, Palm Beach County purchased 175 acres of the Winsberg Farm property near the SRWRF in 1996. The real estate purchase agreement between the county and the seller included restrictions prohibiting most uses of the land other than wetland construction, and stipulated that construction of the wetland begin no later than December 2003. Failure to comply with these requirements would have resulted in ownership of the land reverting to the Winsberg family. Because of these restrictions, Palm Beach County has already constructed Phase 1 of the wetlands project, as shown in **Figure 1-5,** which is a portion of the proposed project discussed in this PIR and environmental assessment.

FIGURE 1-5: AERIAL PHOTO OF PHASE 1 - JANUARY 2005

SECTION 2
*EXISTING CONDITIONS/AFFECTED ENVIRONMENT

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2.0 SECTION 2 -- EXISTING CONDITIONS/AFFECTED ENVIRONMENT

2.1 SIGNIFICANT RESOURCES

The existing conditions section serves to describe the existing physical, ecological and socio-economic conditions within the study area. It does not attempt to provide comprehensive coverage of all resources or concerns. Existing (before) conditions for Winsberg Farm are predicted to change between December 2000 and 2060 if no federal project is implemented.

2.1.1 General Environmental Setting

The Winsberg Farm study area is located in rapidly developing southeastern Palm Beach County west of the municipalities of Boynton and Delray Beach and east of the Arthur R. Marshall Loxahatchee National Wildlife Refuge (LNWR, or Refuge). The Southern Region Water Reclamation Facility (SRWRF) is centrally located in the study area, and State Route 7, the Florida Turnpike, Atlantic Avenue, Boynton Beach Boulevard and several smaller roads divide the region. The region historically consisted of a mosaic of upland and wetland habitats on the eastern fringe of the greater Everglades system, and much of the area was converted from native habitats to agricultural uses (cropland, plant nurseries, and pasture) in the early and mid 20th century. The Winsberg property had been continuously operated as a farm since at least 1956. It had been a farm supporting migrant workers prior to that for an unknown amount of time.

More recently, agricultural land has been progressively replaced by residential and commercial development. In spite of the agricultural and suburban land conversion that dominates the region, remnant Everglades habitats persist in the vicinity of the project area to the west of the East Coast Protective Levee (ECPL) in the Refuge. Urbanization is expected to continue in the project area.

2.1.1.1 Geology

South Florida is underlain by Cenozoic-age rocks to a depth of about 5,000 feet below land surface and is comprised primarily of sand, limestone, clay and dolomite. Geologic units exposed at the land surface in South Florida have been mapped and presented in detailed county maps by the Florida Geological Survey. Sand and Miami limestone are highly permeable; moderately to well drained and mostly underlie the Atlantic Coastal Ridge along the lower east coast (LEC) of South Florida. West of the coastal ridge, soils contain fine sand and loamy material and have poor natural drainage.

The water table typically lays within 10 inches of the surface for two to four months and within a depth of 40 inches the remainder of the year. Two distinct aquifers separated by confining beds compose the groundwater flow system in Palm Beach County. The Pamlico sand, Anastasia and Fort Thompson formations, and the Caloosahatchee marl (composed of permeable sand, limestone and shell beds) comprise the uppermost or surficial aquifer. The limestone Hawthorn, Tampa, Suwannee, Ocala and Avon Park formations comprise the Floridan aquifer at depths from 550 to 650 feet below ground surface.

2.1.1.2 Climate

The subtropical climate of South Florida, with its distinctive wet and dry seasons, high rates of evapotranspiration, and climatic extremes of floods, droughts and hurricanes, represents a major physical driving force that sustains the Everglades while creating water supply and flood control issues in the agricultural and urban segments. South Florida's climate, in combination with low topographic relief, delayed the development of South Florida until the 20th century, providing the main motivation for the creation of the C&SF Project 50 years ago, and continues to drive water management planning of the Everglades Comprehensive Plan today. Seasonal rainfall patterns in South Florida resemble the wet and dry season patterns of the humid tropics more than the winter and summer patterns of temperate latitudes. Of the average 53 inches of rain that South Florida receives annually, 75 percent falls during the wet-season months of May through October. During the wet season, thunderstorms that result from easterly tradewinds and land-sea convection patterns occur almost daily. Wet-season rainfall follows a bimodal pattern with peaks during May-June and September-October. Tropical storms and hurricanes also provide major contributions to wet-season rainfall with a high level of interannual variability and a low level of predictability. During the dry season, rainfall is governed by large-scale winter weather fronts that pass through the region almost weekly. High evapotranspiration rates in South Florida roughly equal annual precipitation. Recorded annual rainfall in South Florida has varied from 37 to 106 inches, and interannual extremes in rainfall result in frequent years of flood and drought. Multi-year high and low rainfall periods often alternate on a time scale approximately on the order of decades.

2.1.2 PLANT COMMUNITIES

The study area historically existed on the eastern fringe of the Everglades in an area likely dominated by flatwood plant communities. Today, most of the area has been converted to agricultural fields or for residential or commercial development, and native vegetation is no longer common (see **Table 2-1** below for more detailed percentages of vegetation in the study area). The habitats of

the native Everglades are generally restricted to the Refuge, which is located immediately west of the project area. Suburban developments with lawns and ornamental plantings dominate the study area east of the Florida Turnpike, while farms producing winter vegetables, such as pepper, corn, and beans, along with landscape nurseries, are more common west of the Florida Turnpike. Commercial enterprises with limited ornamental plantings exist along major thoroughfares, including State Route 7, Atlantic Avenue, and Boynton Beach Boulevard. Canal vegetation information was received from the Lake Worth Drainage District (LWDD). Along the L-29 and L-30 canal banks, there are mostly grass and weeds, along with some invasive Brazilian pepper (*Schinus terebinthifolius*). Aquatic plants in the canals include hydrilla (*Hydrilla verticillata*), hygrophila (*Hygrophila lacustris*), water lettuce (*Pistia stratiotes*), duckweed (*Lemna spp.*), algae and cabomba (*Cabomba caroliniana*). According to LWDD staff, aquatic herbicides are used to control these exotic species.

TABLE 2-1: VEGETATION IN THE STUDY AREA

Vegetation Type	Percent of Study Area
Low-Impact Urban	15.5 %
High-Impact Urban	30.3 %
Exotic Plants	2.9 %
Other Agriculture	5.8 %
Row/Field Crops	21.0 %
Citrus	3.4 %
Improved Pasture	1.5 %
Bare Soil/Clear-Cut	6.6 %
Open Water	3.8 %
Swamp/Marsh	6.1 %
Forest/Shrubs	3.1 %

The Refuge, which encompasses the northernmost portion of the remaining Everglades ecosystem, is a significant resource within the Winsberg Farms study area. With more than 221 square miles of Everglades habitat, the native plant communities found within the Refuge include sloughs, wet prairies, sawgrass, tree islands, cattail and cypress swamp. Numerous macroalgal species exist as submerged natural resources, and at least 50 species of wildflowers can be found in the marsh areas of the Refuge. In addition to the Everglades habitat, a 400-acre cypress swamp, the largest remaining remnant of a cypress strand

that once separated the Pine Flatwoods in the east from the Everglades marshes, can be found within the Refuge.

As agricultural sites are being replaced by suburban development, vegetable crops and nursery plants are being converted to lawns, ornamental plantings, and shade trees. Roads, driveways, parking areas, rooftops and storm water retention ponds are currently replacing the existing vegetative cover. However, some agricultural properties are expected to be retained in the study area due in part to county zoning restrictions. The strong pressure for urban development in the project area will make it difficult for the county to retain those agricultural areas.

2.1.3 FISH AND WILDLIFE

Fish and wildlife species that are adapted to highly disturbed agricultural and suburban land use may occur throughout the study area. The agricultural irrigation and drainage systems and adjacent canals are likely to support amphibians, reptiles, fish and wading birds, although no comprehensive inventory of existing use by wildlife has been performed. Migratory and resident bird species have been observed flying around the Winsberg property and are likely to utilize the limited habitat available within the study area, such as scattered patches of trees and shrubs and seasonally flooded agricultural fields. Small-to-medium-sized mammals may also occur within the study area.

Two sites in the study area do provide considerable habitat to support fish and wildlife species. The first, Palm Beach County's Wakodahatchee Wetlands, is about 50 acres in size and reportedly is visited or inhabited by an abundant variety of wildlife, including turtles, frogs, otters, alligators and at least 120 avian species. The second, the more than 200-square-mile Refuge , is much larger and provides habitat for a vast array of fish and wildlife species, including some 257 avian, 23 mammalian, 17 amphibian, 35 reptilian, hundreds of invertebrate, and at least 46 fish species.

Within the study area there are a large number of fish species, residing in the inland freshwater lakes, canals, sloughs, and borrow pits. Some of the important commercial and freshwater sport fish found in south Florida include: largemouth bass (Micropterus salmoides), redear sunfish (Lepomis microlophus), bluegill (Lepomis macrochirus), black crappie (Pomoxis nigromaculatus), Florida gar (Lepisosteus platyrhincus), threadfin shad (Dorosoma petenense), gizzard shad (Dorosoma cepedianum), white catfish (Ameirus catus), yellow bullhead (Ameiurus natalis), and Tilapia (Tilapia spp.). These fish are not only sought after by fisherman, but are critically important in the diets of predators including wading birds, alligators, otters, racoons, mink, and other animals.

Numerous forage species, including the Cyprinodontids such as the golden topminnow (Fundulus chrysotus), the least killifish (Heterandria formosa), and the Florida flagfish (Jordanella floridae) are commonly found and are known to be important food resources for wading birds, amphibians, and reptiles. Other important forage fish include: golden shiners (Notemigonus crysoleucas), marsh killifish (Fundulus chrysotus), sailfin molly (Poecilia latipinna), bluefin killifish (Lucania goodei), oscars (Astronotus ocellatus), and eastern mosquitofish (Gambusia holbrooki). These fish are important in the processing of food in the form of plankton, macroinvertebrates, and algae and plant material, which is then available to first order predators.

The extensive canal system supports fish species that normally would not be common inhabitants of the Everglades marshes, but are typically found in lakes. These fish include black crappie (Pomoxis nigromaculatus), catfish (Ictalurus spp.), and shad (Dorosoma spp.). Oscars (Astronotus spp,), spotted tilapia (Tilapia mariae), walking catfish (Clarias batrachus), and the black acara (Cichlasoma bimaculatum) are examples of exotic fish species that have become established within south Florida. The origin of these exotics is assumed to be from tropical fish farms in Florida.

2.1.4 THREATENED AND ENDANGERED SPECIES

In response to the February 7, 2002, NEPA scoping letter, the U.S. Fish and Wildlife Service (USFWS) identified four federally listed threatened and endangered species that may be affected by the Winsberg Farm Wetlands Restoration Project (**Table 2-2**). Additionally, in correspondence dated July 6, 2004, the Florida Fish and Wildlife Conservation Commission (FFWCC) provided information on state-listed species potentially affected by the project. Brief descriptions of species designated as federally endangered or threatened are included here. More information is available at the USFWS Endangered Species Program web site at <http://www.fws.gov/endangered/> or from FWC's Bureau of Protected Species Management web site at <http://myfwc.com/imperiledspecies/>. Continued development in the project area without the project will impact threatened and endangered species since they would not be provided the new needed habitat.

TABLE 2-2: FEDERAL AND STATE THREATENED AND ENDANGERED SPECIES AND STATE SPECIES OF SPECIAL CONCERN

Federally Listed Species	
Name	Status
Wood Stork (*Mycteria americana*)	Endangered
Everglades snail kite (*Rostrhamus sociabilis plumbeus*)	Endangered
Eastern indigo snake (*Drymarchon corais couperi*)	Threatened
State Listed Species (only lists species not noted in Federal listing above)	
Roseate spoonbill (*Platalea ajaia*)	Special concern
Limpkin (*Aramus guarauna*)	Special concern
Little blue heron (*Egretta caerulea*)	Special concern
Snowy egret (*Egretta thula*)	Special concern
Tricolored heron (*Egretta tricolor*)	Special concern
White ibis (*Eudocimus albus*)	Special concern
Florida sandhill crane (*Grus canadensis pratensis*)	Special concern
Burrowing owl (*Athene cunicularia*)	Special concern
Osprey (*Pandion haliaetus*)	Special concern
Gopher tortoise (*Gopherus polyphemus*)	Special concern
American alligator (*Alligator mississippiensis*)	Special concern

2.1.4.1 Wood Stork

The wood stork (*Mycteria Americana*) is known to feed in estuarine and freshwater habitats, although it is primarily associated with freshwater areas for nesting, roosting, foraging and rearing young. During the non-breeding season, wood storks are found throughout Florida, with interchange between populations within the state, as well as between states. The wood stork was federally listed as endangered in February 1984, and is also listed as endangered by the state of Florida. No critical habitat has been designated for this species.

Wood storks were observed adjacent to, but not on, the Winsberg Farm during site visits. Regardless, it is assumed that wood storks forage in poor habitat (e.g., drainage ditches, canals and retention ponds) found on the project site and in the surrounding area. Somewhat-improved wood stork foraging habitat is found in the neighboring Wakodahatchee Wetlands. Still, more valuable nesting and foraging habitat are found in the LNWR, located about three miles west of the project site. According to the LNWR Comprehensive Conservation Plan (USFWS 2000), the Refuge has appropriate nesting habitat for wood storks, and some impoundments located on the Refuge could be managed for optimal foraging year-round. While few wood stork nests have been recorded on the Refuge (USFWS 2000), wood storks have initiated nesting within the Refuge as recently as 2004 (Crozier 2004).

2.1.4.2 Everglades Snail Kite

The Everglades snail kite (*Rosthrhamus sociabilis plumbeus*) inhabits relatively open freshwater marshes that support adequate populations of its prey species, the apple snail. On March 11, 1967, the Everglades snail kite was designated as an endangered species. Critical habitat for the snail kite has been designated in Indian River, St. Lucie, Glades, Hendry, Palm Beach, Broward and Dade counties, Florida. The Refuge, which is located immediately west of the project area, has been designated as critical habitat.

Snail kites were not observed in or adjacent to the project area during site visits. Based on habitat requirements described in the South Florida Multi-Species Recovery Plan (USFWS, 1999), no suitable nesting or foraging habitat for snail kites currently exists on the agricultural project site. However, apple snails have been observed in adjacent LWDD canals (Per Mr. Tim Pinion of USFWS), raising the possibility that snail kites could forage in the vicinity. The closest known snail kite nests have been located three miles west of the project site in LNWR, where the species forages but has had poor nesting success (USFWS, 2000).

2.1.4.3 Bald Eagle

Bald eagles (*Haliaetus leucocephalus*) are found in a variety of habitats, but usually nest in older, taller trees and feed in areas that are in close proximity to water. The bald eagle was designated as an endangered species in March 1967. The species' status was upgraded to "threatened" in 1995, and it was de-listed by July 9, 2007 rule in the Federal Register. Under the Bald and Golden Eagle Protection Act, there are management guidelines specified by the USFWS for maintaining and improving the bald eagle populations. The guidelines specify primary and secondary management zones for protection of nest trees with specific restrictions on human activities within these zones.

Bald eagles were not observed in the project area during site visits. According to FWC records, the closest recorded bald eagle nest in 2003 was about 10 miles northeast of the project site (FWC, 2005), placing Winsberg Farms well outside the primary and secondary zones recommended by the USFWS. However, bald eagles have been observed at the nearby Wakodahatchee Wetlands.

2.1.4.4 Eastern Indigo Snake

Throughout peninsular Florida, the eastern indigo snake (*Drymarchon corais couperi*) may be found in all terrestrial habitats (USFWS, 1999). Adult male snakes have larger home ranges than adult females and juveniles; their ranges may encompass as much as 550 and 390 acres, respectively, in the summer months. This species requires sheltered "retreats" from winter cold and

desiccating conditions, such as gopher tortoise burrows. The eastern indigo snake was listed as a threatened species in January 1978. No critical habitat has been designated for this species.

No indigo snakes were observed on the Winsberg Farm during site visits. However, they may dwell in the project site and adjacent areas.

2.1.5 TOPOGRAPHY AND SOILS

2.1.5.1 Topography

Based on a review by the U.S. Geological Survey (USGS) 7.5 Minute Topographic University Park Quadrangle (photo revised in 1983), the project area is relatively flat topographically, drained by numerous canals and ditches.

The agricultural fields of the Winsberg site reflect little topographic variability, but are dissected by numerous, shallow irrigation ditches generally aligned in a north-south direction, with field elevations ranging between 19 and 20 feet National Geodetic Vertical Datum 1929 (NGVD 29). Irrigation ditches are about 10 feet wide at top of bank and extend three to four feet below grade. Surrounding lands in the general vicinity of the Winsberg site exhibit very similar prevailing land elevations. Substantive topographic relief exists only where areas have been landscaped or excavated for fill. Elevations in the project area range between 15 and 20 feet NGVD 29.

2.1.5.2 Soils

According to the Natural Soil Landscape Positions (NSLP) map produced by the South Florida Water Management District for Palm Beach County (http://www.sfwmd.gov/org/pld/proj/wetcons/nslp/pb_map.htm), the predominant soils in the study area are non-hydric and are described as nearly level to gently sloping soils of the flatwoods, generally not subject to flooding. NSLP data is a reclassification of the county soil surveys published by the U.S. Department of Agriculture (USDA).

Based on a report prepared by CH2MHill for the Palm Beach County Water Utilities Department (Winsberg Farm Wetlands Restoration Project 50 Percent Design Summary), Winsberg property soils are generally sandy with traces of marl and hardpan to 10 feet below the land surface. Coordination under the Farmlands Protection Policy Act (FPPA) indicated soils are designated as prime and unique by NRCS.

According to a recent USDA Soil Survey of Palm Beach County, the Winsberg Farms site has 92 percent Myakka sands, 2 percent Immokalee fine sand, 2

percent Oldsmar sand, and 4 percent Arents-Urban land complex (urban). Poorly drained soils and frequently flooded soils like Bassinger and Myakka sands (depressional), Okeelanta muck, Riviera sand (depressional), and Boca fine sand are increasingly more common in the western portion of the study area in the vicinity of the Refuge.

2.1.6 AIR QUALITY

According to the county's published Air Quality Index, the existing air quality within Palm Beach County is considered "Good." Such designation is indicative of the expectation that no health impacts are expected. Additionally, the region meets current National Ambient Air Quality Standards (NAAQS), a condition requisite for its declaration as an "Attainment area" (PBC Amb. Mon. Group, 2004).

The pumping capacity added by this project requires an air general permit (operating license) that will need to be acquired from the Palm Beach County Health Department's (PBCHD) air pollution permitting section, the Environmental Health and Engineering Section. An application to the PBCHD for an Operating License will be required to comply with Clean Air Act Title V Source air permit.

Currently, permit review is handled by the Environmental Health and Engineering Section of the County's Department of Health through whom application would need to be made for an air permit. Staff has been contacted, and currently there are no air quality concerns pertaining to the Winsberg Farms Restoration Project.

On October 17, 2006, the Environmental Protection Agency (EPA) published a final revision to the NAAQS for particulate matter, which calls for tighter particulate standards. However, there have been numerous petitions to the Court of Appeals to review the new 2006 standards and a final decision has not yet been made. In the meantime, the county will work with the EPA to ensure that acceptable standards are met.

2.1.7 WETLANDS

The National Wetland Inventory's online Wetland Mapper (http://wetlandsfws.er.usgs.gov/) identifies a number of isolated wetlands in the project area. The wetlands are largely concentrated in the western portion of the study area within or adjacent to the Refuge. Encompassing more than 221 square miles of the Everglades habitat, the Refuge includes a broad area of marsh, sloughs, wet prairies, sawgrass, tree islands and cypress swamp. While

several small, isolated wetlands are found in the study area east of the Refuge, no wetlands are present on the Winsberg Farm site.

In addition to the expansive wetlands located in the Refuge, a second important, wetland resource is present in the study area. The Wakodahatchee Wetlands, an approximately 50-acre constructed wetland site located immediately southeast of the Winsberg Farm site, served as an example for the current project. Similar to the plan proposed in this report, the Wakodahatchee site is hydrated with treated wastewater from the SRWRF, and exhibits a mosaic of upland, emergent marsh and deepwater habitat that supports a wide range of native flora and fauna.

2.1.8 HYDROLOGY

The study area is located entirely within the 74.6-square-mile Canal-15 (C-15) drainage basin. The C-15 is the only C&SF project canal in this basin, though a network of Lake Worth Improvement District (LWID) secondary and tertiary canals services the area including the C-15 basin. Water supply to the basin is from local rainfall and from pumping Water Conservation Area 1 (WCA 1, also managed as the Refuge). Some interbasin transfers do occur with the C-16 basin to the north and the Hillsboro Canal basin to the south.

Lands within this part of Palm Beach County fall within the SFWMD's C-15 basin. However, the canal systems that provide surface-water management within the C-15 basin upstream of the El Rio Canal are maintained and operated by the LWDD. A network of surface water canals provides for surface and groundwater management for the area. The major north-south conveyance routes nearest to Winsberg Farm are LWDD's E-1 and E-3 Canals, though they do not have a direct influence on surface waters in the immediate vicinity of the farm. However, influence is provided by the canals bordering the property on the north and south. Immediately to the north of the Winsberg property is LWDD's L-29 Canal. On the south side of the property is the L-30 Conveyance. South Florida's canal systems provide the regional surface water management functions required through operation of water control structures and/or pump stations at strategic locations within the system. During extended periods of drought, water elevations within the canal systems can drop below those that need to be maintained to prevent saltwater intrusion at the coastal water-control structures. Under those extreme conditions, additional surface waters may be introduced into the system by LWDD pump station and/or water-control-structure operations that can draw water from the Water Conservation Areas to the west.

The Phase I and Phase II Environmental Audit for the Winsberg Farm Property (prepared by CH2MHill for the Palm Beach County Water Utilities Department)

revealed that the annual rainfall for the Winsberg site ranged from 46.11 to 66.61 inches during the period 1995 through 2002. The monthly extremes during the same period ranged from 13.23 to 0.09 inches.

The Surficial Aquifer System is recharged by local rainfall and infiltration for the surface water management and control system operated by the Lake Worth Drainage District (LWDD). Groundwater levels and gradients are controlled largely by LWDD canal elevations.

The SRWRF water reclamation facility has a design capacity of 30 million gallons a day (MGD) but is presently receiving an annual average of only 20.77 MGD. Volume varies by about 20 percent during the course of the year. The facility has a reuse capacity of 10 MGD. This is the amount that it can legally supply to three sources including the golf course, irrigation of Wakodahatchee Wetlands (50 acres), and the proposed Winsberg Farm Wetlands (150 acres).

However, the current FDEP permit limits the flow of reclaimed waste water to Phase 1 of the Winsberg Farm project to 3 MGD. This permit will have to be modified to include Phase II. The flow limitation will be increased at that time to the total operating capacity of the Winsberg Farm project of 5 MGD. The remaining wastewater is discharged to the boulder zone of the Florida Aquifer System (FAS) via deep wells.

Constructed wetlands have specific hydrological requirements. Therefore it is necessary to operate these wetlands under a hydrograph that is governed by the type of habitat the designer wishes to create, as well as the engineering properties of soil. These hydrographs are used to estimate delivery schedules for the constructed wetlands and are balanced with the amount of wastewater delivered to the facility and the amount disposed via deep wells. The remaining wastewater is apportioned to golf course irrigation and the surrounding wetlands. The deep wells allow the plant to shunt water to them for disposal when the demands for irrigation are less and the hydrological needs of the two wetlands are less.

As the study area is developed and the permeability is changed from agricultural to urban with roads and housing, storm water runoff will increase.

2.1.9 WATER QUALITY

Secondary treatment differs from primary treatment significantly in the type of treatment provided. Whereas primary treatment consists of a separation of solids and liquids through physical processes driven by gravity, secondary treatment consists of a biological processing of the organic waste products contained in the waste stream.

After passing through the primary treatment, the liquid portion of the stream flows into the secondary treatment process. The secondary treatment process is called the "trickling filter/solids contact" process. This process consists of three main treatment components, namely: trickling filters, solids contact basins and secondary clarifiers. Additional details regarding secondary treatment can be found in Sections 7.10 Water Supply of this report.

A summary of nitrogen, phosphorus and fecal coliform concentrations as well as letter reports and additional information on water quality at the plant and in the canals can be found in **Appendix C**.

2.1.9.1 Surface Water Quality

Details on the State of Florida statutes with which the project must comply can be found in **Appendix C**, Section C.4. There are no existing surface-water bodies on the Winsberg Farm property other than the agricultural irrigation canals and ditches. Water-quality data for waters in those canals and ditches are not available.

Water-quality data for the L-30 Conveyance has been collected historically by the Palm Beach County Utility District, Lake Worth Drainage District, and South Florida Water Management District. **Table 2-3** presents total nitrogen (TN) and total phosphorus (TP) data collected quarterly by the PBCWUD at two locations, Jog Road and El Clair Ranch Road, on the L-30 Conveyance between 1995 and 2002. TN concentrations at these locations ranged from 0.4 milligrams per liter (mg/L) to 7.5 mg/L and averaged 1.9 mg/L. TP concentrations ranged from less than 0.1 mg/L to 0.95 mg/L and averaged 0.24 mg/L.

TABLE 2-3: TOTAL NITROGEN AND TOTAL PHOSPHOROUS DATA FOR THE L-30 CONVEYANCE FROM 1995 TO 2002

Year (No. of Samples)	Total Nitrogen (mg/L)			Std. Dev.	Total Phosphorus (mg/L)			Std. Dev.
	Min.	Max.	Avg.		Min.	Max.	Avg.	
1995 (18)	0.778	2.810	1.93	0.539	0.103	0.734	0.301	0.168
1996 (25)	1.260	2.780	1.96	0.395	0.101	0.360	0.195	0.073
1998 (18)	0.961	3.430	1.93	0.579	0.100	0.820	0.281	0.205
1999 (12)	0.400	3.810	1.57	0.896	0.120	0.950	0.288	0.242
2001 (18)	1.040	7.590	2.12	1.628	0.070	0.920	0.209	0.184
2002 (11)	1.080	2.220	1.57	0.375	0.080	0.230	0.151	0.047
Period of Record (102)	0.400	7.590	1.89	0.851	0.070	0.950	0.238	0.166

Notes: Samples Collected at the L-30 Conveyance at Jog Road and El Clair Ranch Road
Source=Palm Beach County Water Utilities Department

The two sampling locations can be viewed on **Figure 2-1** below.

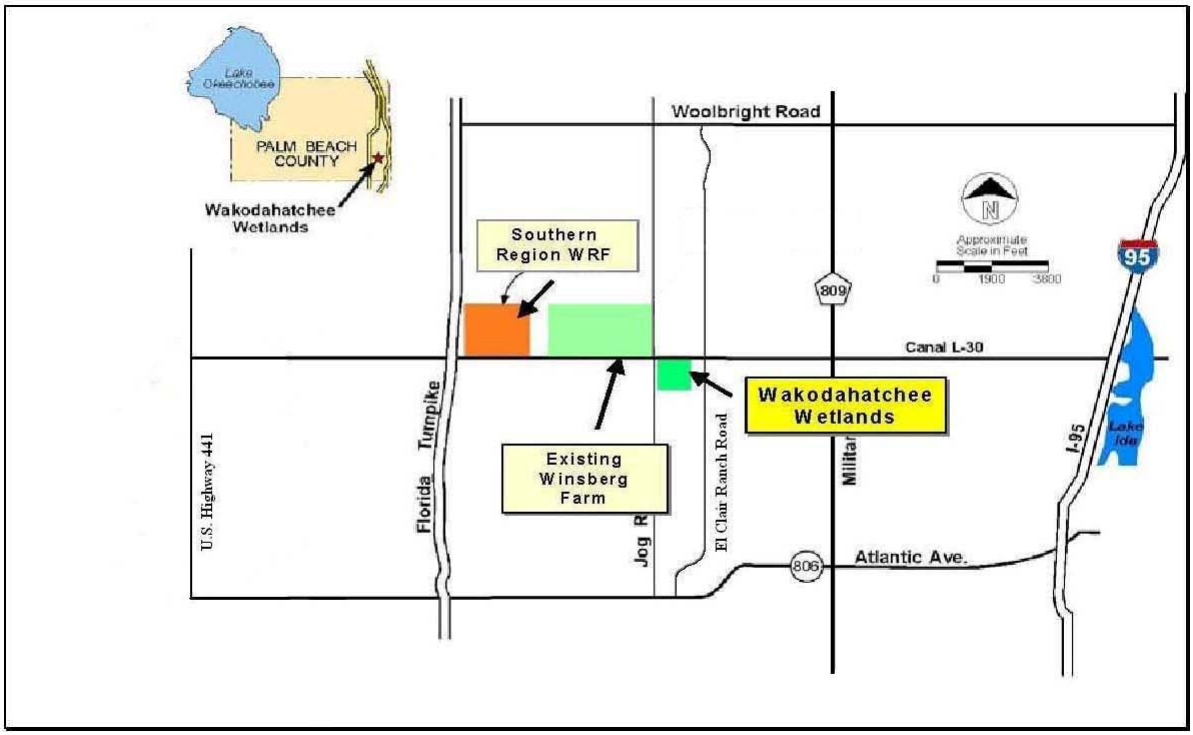

FIGURE 2-1: DATA COLLECTION LOCATION MAP

Available data indicate that dissolved oxygen (DO) concentrations vary widely in the canal from less than 1.0 mg/L to more than 9.0 mg/L, with frequent excursions below the state Class III water-quality criterion of 5.0 mg/L. The sampling station at El Clair Ranch Road is north of the Winsberg site, and the U.S. Highway 441 sampling station is south of the Winsberg site. At the El Clair Ranch Road station, total coliform concentrations ranged from below detection to 2,400 colonies per 100 milliliter (mL) while fecal coliform concentrations ranged from 11 to 1,600 colonies per 100 mL. The L-30 Canal water frequently violates State standards for coliform bacteria contamination, indicating fecal contamination. More detailed data on coliform concentrations is included in Appendix C, Section C.4.

Nutrient and chlorophyll data, as well as trophic-state index calculations using data for the L-30 Conveyance, suggest a moderately eutrophic system (CH2MHILL 1997). Algal growth potential (AGP) testing showed that additions of nitrogen in excess of ambient L-30 Conveyance concentrations significantly increased algal growth. Although additions of phosphorus in combination with nitrogen yielded measurable growth, available data support the conclusion that the system is nitrogen-limited (CH2MHILL 1997).

The proposed project does not currently consist of an alternative that includes surface-water discharge. It should be noted that the L-30 Conveyance, located on the southern boundary of the Winsberg property, has been listed as an impaired water body (reference Impaired Waters Rule, 62-303 FAC). The parameters of concern for which the L-30 has been listed are coliforms, nutrients and DO. The Total Maximum Daily Loads (TMDLs) have not been calculated for the E-3 segment. The CERP general policy of not degrading receiving water bodies would be adhered to for design and operations development purposes as stated above there is no alternative that includes a surface water discharge.

2.1.9.2 Ground Water Quality

Groundwater quality data for sites on Winsberg Farm are not available. However, the county installed and monitored four groundwater monitoring wells as part of long-term groundwater monitoring associated with operation of the original percolation ponds at the Wakodahatchee Wetlands site. Monitoring of these wells was continued through the Wakodahatchee Wetlands project. Wakodahatchee Wetlands groundwater monitoring data are relevant to this study because of their proximity to the L-30 Conveyance and the project study area, and because the source water used for Wakodahatchee is the same as that proposed for the Winsberg Farm Wetlands Restoration Project.

Wells at the Wakodahatchee site are monitored quarterly for 20 parameters that are categorized as nutrients, metals or coliform bacteria. Quarterly groundwater sampling results from January 1999 through January 2001 can be found in **Tables C-3** through **Table C- 6** in **Appendix C**.

2.1.10 SOCIOECONOMICS

This section includes a description of the local economy and demographics of the study area. This descriptive information provides insight into the study area's socio-economic characteristics and provides part of the basis for different facets of the economic impact evaluation work in the rest of this section.

2.1.10.1 Historic Population Trends

From 1950 to 1990, Florida achieved dynamic change in its population. In relation to the remainder of the United States, Florida outgrew the other states by almost 500 percent.

Palm Beach County grew more than 750 percent in the 40 years preceding 1990, as seen in **Table 2-4**. This growth was attributed to Florida's ideal climate and historically low property costs.

TABLE 2-4: PALM BEACH COUNTY, FLORIDA AND US POPULATION 1950-1990 AND POPULATION GROWTH (1,000)

Area	1950	1960	1970	1980	1990	% change
US **	151,325	179,323	203,302	226,542	248,709	62.9 %
Florida	2,771	4,952	6,789	9,746	12,938	366.9 %
Palm Beach County	114.7	228.1	348.8	576.9	863.5	752.8 %

**U.S. Census

2.1.10.2 Existing Population

The Winsberg Farm study area is in the southeastern fringe of a census tract that incorporates a populated area. The affected census tract is 59.28 in western Palm Beach County, see **Figure 2-2**. The census tract provides a convenient area for which data is available and provides a blueprint for the surrounding area, though not exact characteristics of the project site.

The relevant census tract had a 2000 census population of 5,065 (this figure lies entirely within Tract 59.28). In Palm Beach County, the population increased by 31 percent during the 1990 to 2000 period. The population of Florida and the United States increased by 23.5 percent and 13.1 percent respectively during the same period.

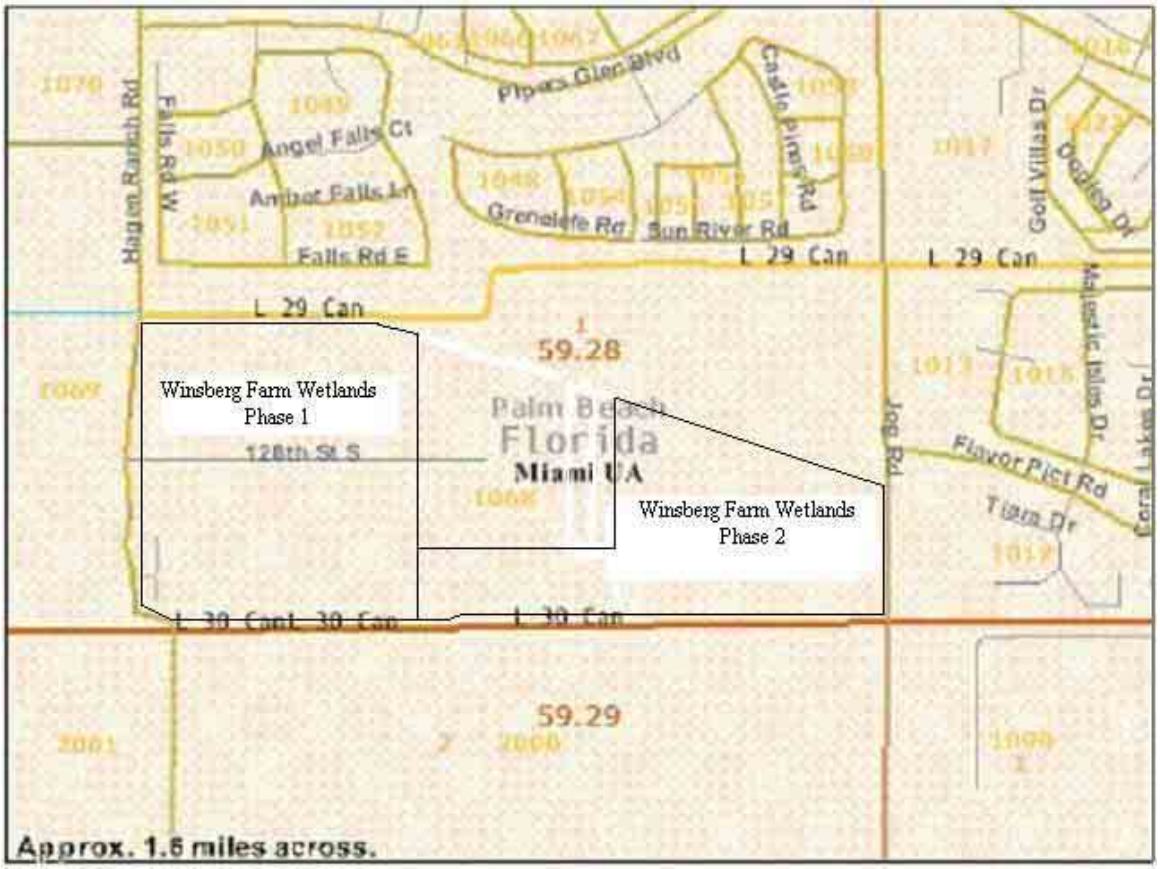

FIGURE 2-2: CENSUS TRACT FOR WINSBERG FARM AREA

Of the 1.13 million residents in Palm Beach County during the year 2000, more than 12 percent are of Hispanic origin. In Palm Beach County, the African-American population is 164,273, or 13.8 percent of the county's population.

Within the affected census tract, the total population is 5,065. Of that number, 4,931 identified themselves as Caucasian, while 57 (3.5 percent) identified themselves to be of African-American descent and 148 identified themselves as having Hispanic roots.

However, within the project area or its impact area, no disadvantaged minority population covered by the Executive Order on Environmental Justice has been identified.

2.1.10.3 Economy

Generally, a strong wholesale and retail trade, government and service sectors characterize Florida's economy. Florida's warm weather and extensive coastline attract vacationers and other visitors and help make the state a significant retirement destination for people all over the country. Agricultural production is

also an important sector of the state's economy and is especially significant to portions of the study area. Compared to the national economy, the manufacturing sector has played less of a role in Florida, but high-technology manufacturing has begun to emerge as a significant sector in the state over the last decade.

The three most significant employment sectors in the Palm Beach County economy are retail trade, administrative support, and guest services (accommodation and food service). In 1997, retail trade in Palm Beach County employed 61,563, administrative support employed 44,306, and guest services employed 41,031. These three top employers paid aggregate 1997 salaries of $1.13 billion, $.86 billion, and $.44 billion, respectively.

The unemployment rate for Florida is 4.0 percent (2007) while the unemployment rate for Palm Beach County is 3.6 percent (2006). In 1999, unemployment in the study-area census tracts was at 16 percent, which represented 65 persons over the age of 16 that are in the labor force. Complete data below the county level is unavailable beyond non-census years.

Personal, per capita income in Florida was $21,557 (1999) while Palm Beach County recorded a much higher per capita income level at $36,383. Miami-Dade and Broward counties remained more consistent with the state average, at $21,688 and $23,170 respectively. The personal, per capita income in the census tract was higher than the rest of the state and the county, at $36,439.

In 1999, it was reported that 12.2 percent of Florida's population lived below the poverty level, while 9.9 percent of Palm Beach County was below the poverty level. In the rest of the LEC, Broward County had 11.5 percent living below the poverty threshold, while Miami-Dade County had 17.6 percent. The percentage of individuals in the highlighted census tract living below the poverty level is considerably lower at 2.1 percent.

TABLE 2-5: DEMOGRAPHICS STATISTICS

Florida:	
Population, 2000	15,982,378
Change in population, 1990-2000	23.5 %
Below poverty level, 1999 estimate	12.5 %
White, 2000	78.0 %
Black, 2000	14.6 %
Other, 2000	7.4 %
Hispanic Origin, 2000	16.8 %
Palm Beach County:	
Population, 2000	1,131,184
Change in population, 1990-2000	31.0 %
Below poverty level, 1997 estimate	9.9 %
White, 2000	79.1 %
Black, 2000	13.8 %
Other, 2000	7.1 %
Hispanic Origin, 2000	12.4 %
Census Tract 59.28:	
Population	5,065
Percent below poverty level	2.1 %
White	97.4 %
Black	1.1 %
Some Other Race ("non-white other" share of population negligible)	1.5 %
Hispanic Origin	2.9 %

**2000 U.S. Census
*** Hispanic Origin can be of any race (white, black, or other).

2.1.10.4 Water Supply Demands

In the study area, surficial aquifers supply the majority of water for urban use. Rainfall, the primary supporter of the agriculture water demand in South Florida, and surficial waters (canals, shallow groundwater and ponds) provide the majority of the irrigation demands in the watershed. Salinity intrusion is becoming a predominant problem for water supply and has resulted due to two events occurring the the LEC area. The first is the lowering of the groundwater table in the area due to drainage and reduced recharge, as well as the increased withdrawal of water by pumping. The second event is the construction of numerous drainage and navigation canals from inland areas to the coastal waters.

Currently, water shortages and restrictions are implemented during low rainfall periods or droughts.

The U.S. Geological Survey (USGS) estimates annual water withdrawals for Florida at the county level every five years. The most recent publication of findings was entitled Water Withdrawals, Use, Discharge, and Trends in Florida, 1995. Water-use estimates for 2000 were not published at the time of this analysis. However, unpublished water-use estimates for 2000 for the nine counties included in this analysis were obtained from the USGS. These uses are distributed as public-supply and self-supply domestic (residential), commercial, industrial, government and recreational water-use estimates, along with unaccounted-for, water-loss estimates. **Table 2-6** represents the USGS-estimated 2000 water use for the nine-county area, excluding mining and power generation water use. Total public-supply water use for the region is estimated at 960.51 MGD, and total M&I water use is estimated at 1,176.79 MGD. The addition of the 1,901.14 MGD of agricultural water use (which will not be forecast in this analysis) increases total water demand for the region to 3,077.93 MGD. Agricultural water use accounts for 62 percent of the total use, and all M&I uses account for 38 percent. **Figure 2-3** shows the M&I water use by county in 2000.

On the county level, the largest water user in the study area in 2000 was Palm Beach County, mainly because of the large Everglades Agricultural Area. Palm Beach County used a total of 1,276.66 MGD, or more than 41 percent of the total regional water use. Of this amount, 946.16 MGD (74 percent) was agricultural use and 330.5 MGD was M&I water use. The large recreational water use results from the numerous golf courses in the county.

TABLE 2-6: USGS-ESTIMATED TOTAL WATER USE, FOR SELECTED COUNTIES, 2000, EXCLUDING MINING AND POWER GENERATION (MGD)

County	Municipal and Industrial						Agriculture	Grand Total
	Public Supply	Self-Supply				Sub Total		
		Domestic	Commercial	Industrial	Recreation			
Broward	258.06	2.11	0.54	0.00	37.00	297.71	4.10	301.81
Glades	0.55	0.61	0.04	0.00	0.42	1.62	69.02	70.64
Hendry	4.72	1.67	0.21	0.51	1.09	8.20	503.91	512.11
Lee	52.37	8.86	0.46	0.09	22.66	84.44	60.51	144.95
Martin	18.45	4.20	0.37	2.78	7.88	33.68	140.02	173.70
Miami-Dade	377.27	4.85	1.29	0.00	13.39	396.80	110.35	507.15
Monroe	17.02	0.08	0.10	0.00	1.85	19.05	0.03	19.08
Okeechobee	2.23	1.52	0.36	0.00	0.68	4.79	67.04	71.83
Palm Beach	229.84	10.17	0.59	15.81	74.09	330.50	946.16	1,276.66
Total	960.51	34.07	.396	19.19	159.06	1,176.79	1,901.14	3,077.93

NOTE: Recreation self-supply water use includes golf course irrigation.
Source: USGS unpublished data, 2002.

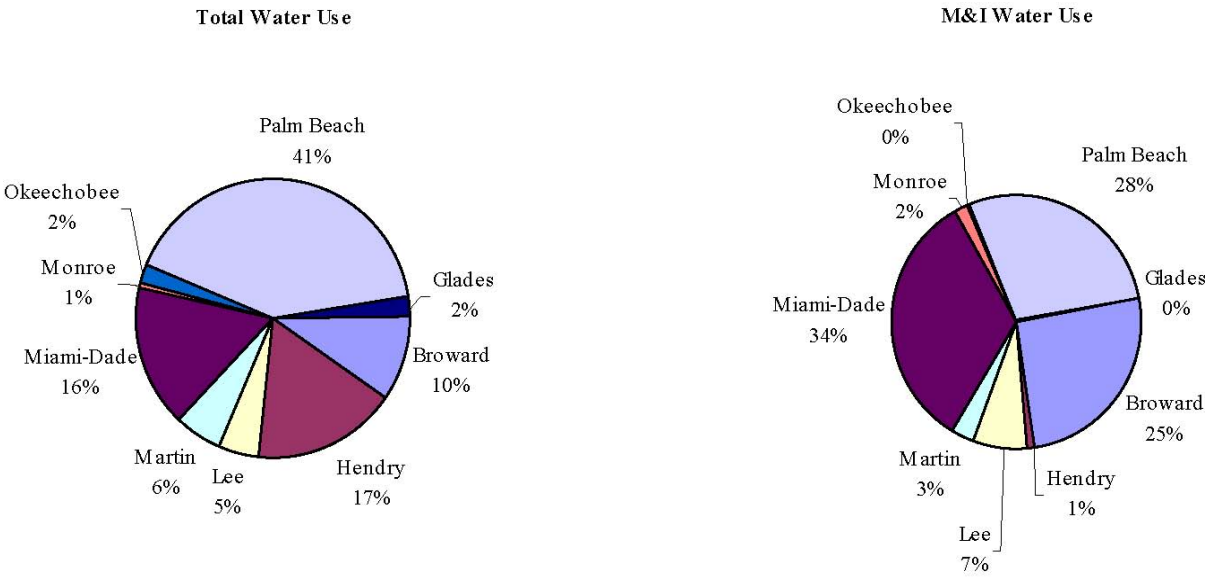

FIGURE 2-3: DISTRIBUTION OF USGS-ESTIMATED 2000 TOTAL AND M&I WATER USE, BY COUNTY

2.1.10.4.1 Agricultural Water Use

Agriculture is a significant irrigated land user of the LEC region. Agricultural land use represents less than one-quarter of land use in the service area, and in many areas, will be virtually non-existent in the future.

Rainfall is the primary supporter of agricultural water demand in South Florida -- about 59 inches per year within the LEC. Surficial waters (canals, shallow groundwater and ponds) provide the majority of the irrigation demands in the watershed. During droughts, agricultural water users have higher irrigation demands and water supplies are usually at their lowest levels during this time. Consequently, water-shortage management policies are implemented that restrict water use, resulting in agricultural water users not receiving required water volumes. This can lead to reduced crop yields and economic damage.

2.1.10.4.2 Municipal and Industrial Water Demand

The Winsberg Farms project site falls within Service Area 1 of the LEC region. As stated in **Table 2-7** below, Winsberg accounts for almost 25% of the water usage in the region.

TABLE 2-7: ENTIRE STUDY AREA, M&I CONSERVATION-ADJUSTED WATER USE AND DISTRIBUTION, BY SERVICE AREA MOST-LIKELY POPULATION SCENARIO, 2000

	2000	
Area	MGD	Percent of Total
Service Area 1	263.9	24.6%
Service Area 2	299.2	27.9%
Service Area 3	373.2	34.8%
NPBCSA	85.6	8.0%
Sub-Area 2	31.1	2.9%
Sub-Area 3	3.1	0.3%
Sub-Area 4	16.9	1.6%
Sub-Area 5	0.6	0.1%
Total	**1,073.6**	**100.0%**

NPBCSA: North Palm Beach County Service Area

2.1.10.5 Recreation Usage and Demand in the Project Area

Southeastern Palm Beach County has a number of county park facilities maintained by the Parks and Recreation Department. Most of these are aligned with the needs of routine users. Thus, most facilities are designed to support the typical sports-oriented and associated activities. As discussed in previous sections, Phase 1 of the Winsberg Farm project has been constructed. It includes all of recreational features of the project. See the extensive discussion in the Recreation **Appendix H**.

Because of the efforts of the PBCWUD, this specific study area also benefits from the presence of the 40+ acres of constructed wetlands at the county's Wakodahatchee Wetlands located on the south side of the L-30 Conveyance and just east of Jog Road. As described elsewhere in this document, the Wakodahatchee Wetlands site has been touted as an important bird-watching site in Palm Beach County. Thus, there is precedent for a wetland park facility having great value to residents and visitors to the area in the form of passive recreational benefits (bird-watching, nature photography, etc.). The Wakodahatchee Wetlands site is provided with boardwalks that meander through much of the constructed wetlands area, and these have become a favored jogging and walking route for residents of adjacent communities. Use of this facility for recreation exceeded original expectations, and the county responded by increasing parking facilities and improving lighting and security to enhance site use for such purposes.

The study area lies in the South Florida Region (Region X), as defined by the Florida State Comprehensive Outdoor Recreation Plan (SCORP). This region encompasses more than 3,600 square miles in Palm Beach, Indian River, St. Lucie and Martin counties. This region offers excellent opportunities for camping, hiking, swimming, bicycling, fishing, boating and saltwater beach activities. Currently, saltwater beach activities, bicycle riding and hiking are the most popular resource-based activities. Swimming pools and golf courses attract the most user-oriented activity in the South Florida Region.

The Refuge offers many recreational opportunities, such as walking trails, canoe trail, bike trail, boat ramps, fishing platform, observation towers, butterfly garden and visitor center.

Recreation adjacent to the Winsberg Farm area is defined and managed by the USFWS. The study area is close to the Wakodahatchee Wetlands. Legal recreation activities allowed within the area include: water fowl hunting by permit in some areas, fishing, wildlife viewing, hiking, biking and boating. Boating and fishing are the most popular activities, with two adjacent boat ramps and air-boating facilities. A myriad of species of game fish (largemouth bass, bluegill, catfish and several species of exotic fish) make this area attractive to sportsmen.

In addition to the game fishing provided in the Everglades Wildlife Management Area (Wildlife Conservation Areas 2 and 3), the canal system helps preserve a habitat for smaller fish during periods of drought. These fish are prey for many species of wading birds, and are managed by the state of Florida.

Table 2-8 highlights the various supply and related needs for recreational resources in South Florida (Region X). From the table, it is shown that bicycle riding mileage, freshwater fishing areas, hiking trails, and hunting areas have reached their current capacities and require additional units for each participant to achieve maximum utility. Additionally, to a lesser extent, more camping sites and freshwater beaches are needed to fulfill current user demand.

TABLE 2-8: SOUTH FLORIDA (REGION X)-ESTIMATED DEMAND AND NEED FOR OUTDOOR RECREATION RESOURCES AND FACILITIES, 2000

Activity (User Occasions)	Demand (Units)	Resource Needs
Archaeological/Historic Site	1,303,665	0 Sites
Bicycle Riding	12,926,026	867.46 Miles
Camping (RV/Trailer)	1,706,273	0 Sites
Camping (Tent)	513,387	183 Sites
Freshwater Beach Activities	342,264	0 Miles
Freshwater Boat-Ramp Use	85,544	0 Lanes
Freshwater Fishing	589,954	0 Feet
Hiking	1,464,722	291.60 Miles
Horseback Riding	156,045	0 Miles
Hunting	115,776	0 Acres
Nature Study	2,365,741	21.72 Miles
Picnicking	1,645,916	0 Tables
Saltwater Beach Activities	26,536,059	0 Miles
Saltwater Boat-Ramp Use	845,598	0 Lanes
Saltwater Fishing	1,318,774	0 Feet

*Florida Department of Environmental Protection

The SCORP organizes outdoor recreation in Florida into 47 categories that encompass a variety of recreation activities, including team sports (e.g., basketball and baseball), individual sports (e.g., golf and tennis), hunting, fishing, swimming and boating. **Table 2-9** presents descriptive information on recreation facilities in SCORP Region X for study-area-specific recreation categories. These resource-based categories were selected as those that could potentially be affected by the hydrologic or ecological changes associated with alternative restoration plans. This table also includes percentages of the statewide totals for recreation categories.

TABLE 2-9: REGIONAL OUTDOOR RECREATION FACILITIES REGION X, 1998

Resource/Facility	Region X	% of State Total	State Total
Outdoor Recreation (Areas)	1.255	10 %	13,097
Outdoor Recreation (acres)	565,139	5 %	10,850,904
Land (acres)	501,342	6 %	9,077,004
Water (acres)	63,796	4 %	1,773,900
Total Hunting (acres)	333,527	5 %	6,168,716
Hunting Land (acres)	303,756	5 %	6,046,955
Hunting Water (acres)	29,771	24 %	121,761
Camping			
RV/Trailer Camp Sites	5,385	4 %	138,576
Tent Camp Sites	563	6 %	10,214
Trails			
Hiking Trails (miles)	289	7 %	3,904
Horseback Riding Trails (miles)	100	7 %	1,443
Nature Trails (miles)	66	6 %	1,043
Freshwater Catwalks	23	3 %	748
Boating			
Canoe Trails (miles)	17	1 %	2,587
Freshwater Boat-Ramp Lanes	109	6 %	1,973
Freshwater Marinas	18	4 %	511
Freshwater Slips/Moorings	698	6 %	11,758
Saltwater Marinas	200	18 %	1123
Saltwater Marina Slips	5,457	12 %	45,839

Source: Florida Department of Environmental Protection. 2000

2.1.10.5.1 Recreation Demand General

Profiles of existing and future recreation demand in the study area can be developed by drawing on information at the national, state, regional and local levels.

In general, the variety of recreational interests in the United States appears to be increasing along with recreational participation rates. As future recreation needs and interests develop, it is important to recognize that participation in specific types of recreational activities is often linked to demographic factors, such as age and income. For example, participation in activities requiring vigorous exercise is considerably higher for young people than for senior citizens. However, the elderly population has increasing recreation participation because of the growing awareness of the importance of physical fitness. Predictably, participation in most activities is low for those with family incomes below $25,000 per year. Interestingly, participation is also low for those with family incomes greater than $100,000 per year. Most outdoor recreational activities appear to be enjoyed largely by the middle class, those with family incomes between $25,000 and $75,000 per year.

2.1.10.6 Land Use

Land use data for the study area were acquired from SFWMD and from Palm Beach County. Examination of the data revealed that the majority of lands within the study area are currently in various stages of development. Residential developments (e.g., single family, condominiums, golf course communities, etc.) represent the largest land-use category, accounting for about 58 percent of the area. Agricultural areas (e.g., crops, orchards, pasture, etc.) account for about 25 percent of land use within the study area. The final 17 percent is made up of a mixture of wetlands and open water.

Based on data from the Palm Beach County parcel database, 96 parcels in the study area are similar to the Winsberg Farm site in terms of agricultural land use and size (at least 175 acres).

In 2005, the Winsberg family sold an additional 43 acres for suburban development. The existing Winsberg property is not large enough for conventional commercial farming. The available land surrounds an out-parcel where the current owners, Ted and Trudy Winsberg, currently reside. An unpaved road provides access from Jog Road to the Winsberg home. Several buildings, historically occupied by migrant farm workers, are located in the southwestern portion of the property.

Adjacent properties consist of agricultural lands and residential developments. The SRWRF is immediately west of the Winsberg property across Hagen Ranch Road, and the Wakodahatchee Wetlands are to the southeast across Jog Road.

2.1.11 AESTHETICS

Consideration of aesthetic resources within the project study area is required by the National Environmental Policy Act of 1969 (NEPA) PL 91-190, as amended. Aesthetic resources are defined in ER 1105-2-50 as "those natural and cultural features of the environment which elicit ... a pleasurable response" in the observer, most notably from the predominant visual sense. Consequently, aesthetic resources are visual resources, or features that can potentially be seen.

The project area can be described using three dominant land-use categories: 1) natural areas, 2) agricultural lands and 3) urban areas. Natural areas dominate in the western portion of the study area, where the expansive wetland habitat of the Refuge is found. Agricultural lands dominate west of the Florida Turnpike and urban areas dominate east of the turnpike. While the Winsberg site is east of the turnpike, it exists as an agricultural property.

2.1.12 HAZARDOUS, TOXIC AND RADIOACTIVE WASTE

Because the Winsberg project is part of CERP, the first step in the plan formulation process is to reaffirm that the Winsberg site is cost-effective. Therefore, it was necessary to evaluate other sites in the area. The York, Bowman and McMurrian sites as well as the Winsberg site were evaluated. See Figure 5-1 in Section 5.3.2.1. A Hazardous, Toxic, and Radioactive Waste (HTRW) evaluation was conducted for each site as part of the cost analysis.

USACE regulations require that Comprehensive Environmental Response Compensation and Liability Act (CERCLA)-regulated substances be inventoried and assessments conducted for the purpose of determining the hazardous potential of each pollutant of concern at respective project sites. CERCLA includes substances designated as hazardous discharges and toxic pollutants under the Clean Water Act, and include RCRA, Clean Air Act (CAA), and certain TSCA substances or mixtures, or hazardous substances specifically designated to be so under CERCLA.

CERCLA specifically excludes exposures resulting from the normal application of fertilizer. Additionally, under RCRA, the disposal of pesticides during farming processes is excluded from regulation. Therefore, for the purpose of the Winsberg project, only non-agricultural constituents could be CERCLA-regulated. No contaminants considered "hazardous" under RCRA (or any other Acts that fall under the CERCLA umbrella of hazardous discharges and toxic pollutants) were found at Winsberg as a result of environmental assessment activities. This is because project-area media contain relatively low levels of some persistent pesticides throughout the site. There are no contaminates from outside the project footprint leaking onto or contaminating the project area. Should any contamination be found, the site will be cleaned to comply with all Federal and State standards at the expense of PBCWUD before the Corps can consider it part of the Federal project.

Environmental audits for Phases I and II have been conducted on Winsberg (Green Cay), York, Bowman, and McMurrian Farm properties, respectively. These audits were conducted for the purposes of property transaction and/or suitability analyses for the potential use of these properties for indirect recharge and wetland restoration. The scope of work for these audits included the following tasks:

- Conduct a Phase I audit consisting of a file search and preliminary site visit to identify visibly contaminated areas; and
- Conduct a Phase II audit consisting of (1) installation of seven temporary monitor wells, (2) groundwater sampling, soil sampling, and laboratory analyses, and (3) interpretation of results.

In 1997, the PBCWUD contracted with CH2MHill to conduct Phase I and Phase II Environmental Audits of the Winsberg Farm property. These audits determined that the Winsberg site has been undeveloped and used for the growth and distribution of agricultural products for more than 30 years. Upon reviewing PBCWUD files and public data sources, CH2MHill determined that "*there is no reason to believe (that) this site has been adversely impacted by past onsite practices or neighboring properties.*" The consultant further reported that no Leaking Underground Storage Tanks; Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); or Resource Conservation and Recovery Act (RCRA) sites were identified within a one-mile radius of the site.

A Hazardous, Toxic and Radioactive Waste (HTRW) assessment was recently completed (Taylor, June 2004) as an update to earlier assessments. Results of this assessment confirmed earlier concerns expressed regarding potential HTRW concerns on the Winsberg site.

To ensure the site was completely and defensibly assessed for HTRW, USACE contracted with Taylor Engineering to complete the Phase 1 activities in accordance with ASTM guidance and to re-analyze samples at Phase 2 locations for remaining parameters of concern.

Of the alternate sites evaluated, the York property (Section 6), the Bowman property (Section 7), and the McMurrian Farms property (Section 12) have had Phase I/II Environmental Site Assessments (ESA) conducted. The remaining three sites -- Sections 1, 30 and 31 -- have not had ESAs conducted.

Summaries of the Analytical Results from Green Cay (Winsberg) (I), Bowman (II), IV York Property, and McMurrian Farms (III) are available in **Appendix C** Section C.7.

2.1.13 NOISE

The study area is characterized by large tracts of rural and agricultural areas with small urban areas interspersed. Consistent with this landscape, external sources of noise are limited and of low occurrence.

2.1.14 CULTURAL RESOURCES

A Phase I Cultural Resource Survey of the Winsberg Farm property was conducted on February 14, 2003, by a USACE contractor. The survey concluded that the project area had no significant cultural resources listed, nor was it eligible for listing, on the National Register of Historic Places. Based on the December 2002 draft of this Survey, The Florida State Historic Preservation

Officer, in a December 5 2002 letter, concurred with the findings of the survey. No further evaluation, documentation or fieldwork was recommended.

In addition, a review of the Florida Master Site files indicated no reported cultural resources in the project area.

SECTION 3
*FUTURE WITHOUT-PROJECT CONDITIONS

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3.0 SECTION 3 -- FUTURE WITHOUT-PROJECT CONDITIONS

3.1 FORECAST OF FUTURE CONDITIONS

3.1.1 Without-Project Definition

The U.S. Water Resources Council's Principles and Guidelines (USWRC, 1983), National Environmental Policy Act of 1969 (NEPA), and U.S. Army Corps of Engineers (USACE) ER 1105-2-100 all require formulation of a "without-plan" condition. This condition is for the evaluation and comparison of alternative plans and identifying the impacts (beneficial and adverse) attributable to proposed federal actions. Future "without-project" conditions describe the most likely conditions in the Winsberg Farm study area that will exist at the end of the period of analysis absent a federal water resources project. In accordance with USACE planning policy, the date for both "future with" and "future without-project" conditions was determined to be the year 2060. The "without-project" or "without-plan" condition is the same as a "no-action" condition.

During plan formulation and alternative evaluation, as explained in Section 5 of this document, alternative plans are compared to the "future without-project" condition. The tentatively selected plan is described briefly at the end of Section 5 and in detail in Section 6. The environmental impacts and effects of the future "with-plan" conditions of the recommended alternative can be found in Section 7 of this document.

3.1.2 Planning Horizon/Period of Analysis

The "future without-plan" condition is a forecast of conditions within the Winsberg Farm project area without implementation of any federal plan alternatives. The project will use the year 2060 for the period of analysis. We assume the project will begin in 2010. Therefore, alternative plan evaluations and comparisons utilize a 50-year period of analysis.

3.1.3 Future Without-Project Condition and No-Action Alternative

This study is proceeding under the assumption that if there is no federal project, then remaining project lands acquired by Palm Beach County would revert to the seller (Winsberg family) according to the terms of the purchase agreement. The Phase 1 project already constructed would likely remain a constructed wetland with recreational use. However, there would likely be no further wetlands constructed at the project site. It is expected that the land would remain as a farm for a short time, but well before the year 2060 the land would be developed for residential use or a mix of residential and commercial uses, consistent with surrounding land uses. This area of eastern Palm Beach County

has been and continues to be rapidly developing. The communities are continuing to grow, and the only direction to grow is westward, directly toward the agricultural lands such as Winsberg Farm. Two of the farms adjacent to Winsberg Farm have been developed between 2000 and 2003.

3.2 GEOLOGY

The future without condition is the same as the existing condition.

3.3 CLIMATE

Compared to existing conditions, it is not expected that there will be any measurable change in the local climate in the future without-project condition.

3.4 PLANT COMMUNITIES

In the Future Without-Project Condition, or No-Action Alternative, as agricultural sites are replaced by suburban development, vegetable crops and nursery plants will be replaced with lawns, ornamental plantings, and shade trees. Roads, driveways, parking areas, rooftops and storm water detention ponds will also replace the existing vegetative cover. However, some agricultural properties are expected to be retained in the study area due in part to county zoning restrictions.

3.5 FISH AND WILDLIFE

In the Future Without-Project Condition, or No-Action Alternative, the limited habitat that exists on the remaining agricultural lands in the study area will generally be replaced with a different but also limited habitat as residential development increases. There will be storm water retention ponds, which may draw waterfowl. The two locations providing important wildlife habitat in the study area, Wakodahatchee and the Refuge, are expected to function as at present.

3.6 THREATENED AND ENDANGERED SPECIES

For the Future Without-Project Condition or No-Action Alternative, continued development activity and human population growth in the project area will likely continue to adversely impact threatened and endangered species as the project, as habitat area and functions decline.

3.7 TOPOGRAPHY AND SOILS

As individual properties in the study area are converted from agriculture to suburban development, on-site topography and soils would be expected to be altered in the future.

3.8 AIR QUALITY

As the area becomes more developed and population increases, more automobile exhaust and energy-plant emissions will negatively impact the area.

3.9 WETLANDS

The future without condition is the same as the existing condition.

3.10 HYDROLOGY

As the study area is developed and land cover (and associated soil permeability and runoff coefficients) change from agricultural to urban with roads and housing, storm water runoff will increase.

3.11 WATER SUPPLY

With the increase in population and infrastructure, the demand for water will increase and the shortages and restrictions will become more prominent, leading to economic and environmental impacts. In the study area, groundwater is the predominant source of water withdrawals for municipal and industrial uses. This trend is expected to continue in the future. As demand and water use increase, groundwater levels would continue to decline, leading to increased shortages of water and increased salinity levels in wells in the study area. With more persons drawing water and less water available for recharge, shortages to wells and well fields would become more prevalent.

3.11.1 Agricultural Water Demand

Palm Beach County and the southeastern coast of Florida are anticipated to undergo continuing conversion of remaining agricultural lands to mixed use commercial and residential and urban uses between now and 2060. Agricultural land use represents less than one-quarter of the current land use in the service area, and in many areas will be virtually non-existent in the future. As urban landscape and M&I water supply demands increase, overall water shortages will become more prevalent, leading to greater restrictions on the amount of water available for agricultural water supply.

3.11.2 Municipal and Industrial Demand

The LEC Region municipal and industrial water demand forecast is shown in **Table 3-1**. The LEC service areas consists of Service Areas 1 (eastern Miami-Dade County), 2 (most of eastern Broward County), 3 (mostly Southeastern to East Central Palm Beach County), Northern Palm Beach County Service Area (NPBCSA), and Sub-areas 2 through 5 of the Lake Okeechobee Service Area (LOSA). Figures are derived from the University of Florida's Bureau of Economic and Business Research, with population and employment projections collected for the 2000 Initial CERP Update. The section of the Initial CERP Update that applies to the Winsberg Farms study area is Service Area 1, which encompasses a majority of Palm Beach County. Water-demand projections estimate the Service Area 1 most-likely population scenario, conservation–adjusted water use in 2050 at 429.3 MGD, as displayed in **Table 3-2**. This accounts for 28.5 percent of the entire LEC study area. Due to the exceptionally small rate of growth projected between 2050 and 2060, it is not expected that 2060's water demands will be substantially higher than in 2050, after taking into account conservation measures.

TABLE 3-1: M&I CONSERVATION-ADJUSTED WATER USE AND DISTRIBUTION

	2000		2025		2050	
Area	MGD	Percent of Total	MGD	Percent of Total	MGD	Percent of Total
Service Area 1	263.9	24.6%	365.7	26.7%	429.3	26.8%
Service Area 2	299.2	27.9%	385.2	28.1%	450.5	28.1%
Service Area 3	373.2	34.8%	430.2	31.4%	502.3	31.3%
NPBCSA	85.6	8.0%	122.9	9.0%	146.1	9.1%
Sub-Area 2	31.1	2.9%	38.4	2.8%	43.5	2.7%
Sub-Area 3	3.1	0.3%	3.7	0.3%	4.4	0.3%
Sub-Area 4	16.9	1.6%	23.0	1.7%	27.2	1.7%
Sub-Area 5	0.6	0.1%	0.7	0.1%	0.8	0.1%
Total	**1,073.6**	**100.0%**	**1,369.9**	**100.0%**	**1,604.2**	**100.0%**

NPBCSA = Northern Palm Beach County Service Area.

*Entire Study Area, M&I Conservation-Adjusted Water Use and Distribution, by Service Area Most-Likely Population Scenario, 2000, 2025, and 2050

TABLE 3-2: ESTIMATED 2050 SERVICE AREA 1 CONSERVATION-ADJUSTED

End Use	2000 Demand	2050 Demand
Service Area 1	263.9	429.3

*Estimated 2050 service area 1 conservation-adjusted, most-likely population scenario (MGD)

Figure 3-1 displays the distribution of total conservation-adjusted M&I water use by service area from 2000 to 2050.

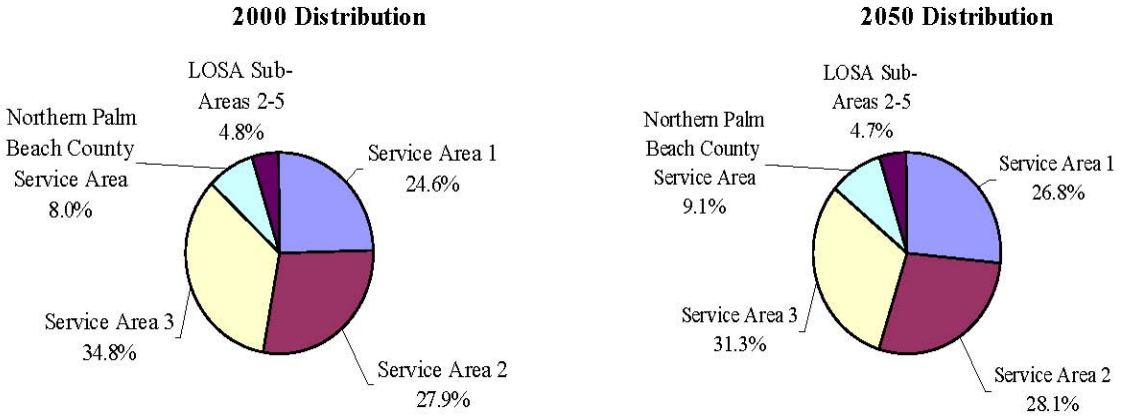

FIGURE 3-1: DISTRIBUTION OF TOTAL CONSERVATION–ADJUSTED M&I WATER USE

*Distribution of total conservation–adjusted M&I water use, by service area, 2000 and 2050, most-likely population scenario

Figure 3-2 below shows most-likely population scenario M&I conservation-adjusted forecast by water use sector for Service Area 1, which correlates to the Winsberg Farms project area.

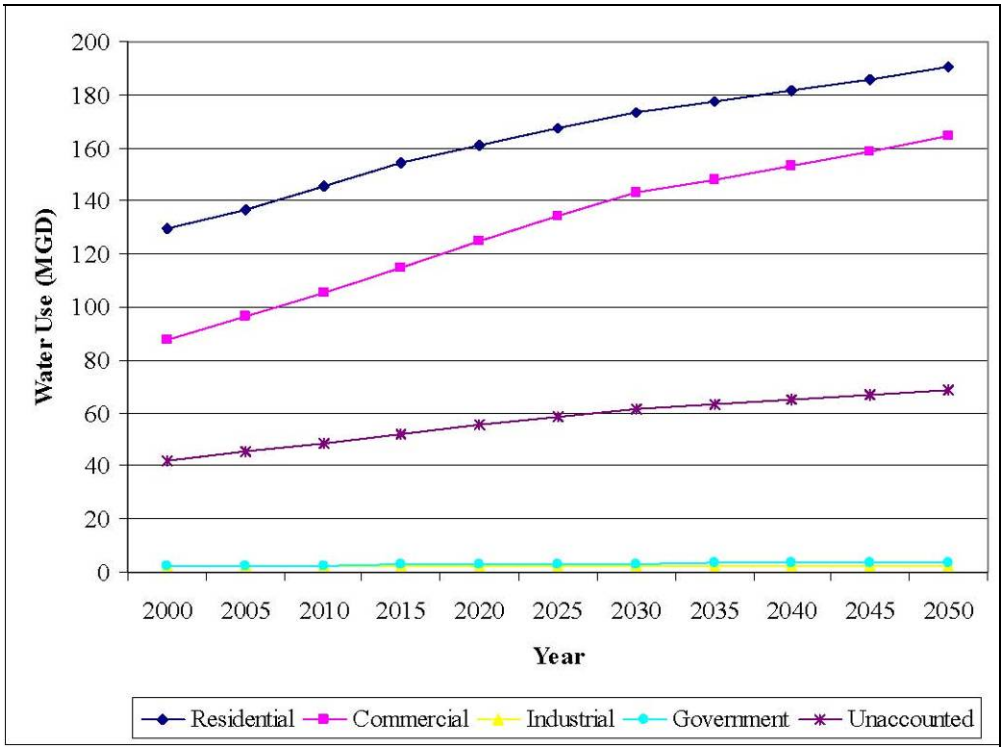

FIGURE 3-2: SERVICE AREA 1, M&I CONSERVATION-ADJUSTED FORECAST

*Service Area 1, most-likely population scenario M&I conservation-adjusted forecast by water use sector

3.12 SURFACE WATER QUALITY

With regard to the future-without condition, surface-water quality in terms of nutrients, dissolved oxygen and emerging pollutants of concern (i.e., EPOCs -- such as antibiotics, pharmaceuticals, household and industrial wastewater products, and hormones) would be expected to decline as development continues in the project area and even to a greater extent given the without-project condition.

3.13 GROUNDWATER QUALITY

It is anticipated that there will likely be an increase in contaminated urban runoff as development increases in the future without-project condition. However, no net water quality degradation is expected due to expansion of the storm water collection infrastructure.

3.14 STATE RECREATION TRENDS

Recreation demands were developed for the Florida State Comprehensive Outdoor Recreation Plan (SCORP) through surveys of residents and tourists. The Division of Recreation and Parks conducts periodic surveys of resident and tourist participation in recreation activities to track outdoor recreation usage and needs in Florida. Recreation participation information was derived from the 2000 surveys conducted by the University of Florida, Department of Recreation, Parks and Tourism. Participation in outdoor recreation activities is expressed in terms of user-occasions, which occur each time an individual takes part in a single outdoor recreation activity. Demand was estimated for 1997, 2000, 2005 and 2010 by applying per capita participation rates to population projections.

Table 3-3 presents 1997 and projects 2010 demands for the selected recreation activities in SCORP Planning for Region X. This table includes user-occasions, as well as facility/resource needs. As part of the without-project conditions, all of the regions are expected to have significant increases in demands for the selected recreation activities with a commensurate need to increase development of the regions' recreation resources and facilities.

TABLE 3-3: DEMAND AND FACILITY NEEDS SELECTED RECREATION ACTIVITIES

Activity	Units	Demand (user-occasions)		Resources / Facility Needs	
		1997	2010	1997	2010
Hunting	Acres	6,921	8,774	0	0
RV/Trailer Camping	Camp Sites	501,288	656,161	0	0
Tent Camping	Camp Sites	155,069	204,538	0	0
Hiking	Miles	1,361,764	1,754,904	273	435
Freshwater Fishing	Feet	1,276,522	1,678,705	23,654	33,618
Nature Study	Miles	820,221	1,058,861	0	0
Bicycle Riding	Miles	11,247,561	14,417,186	781	1,043

Source: Florida Department of Environmental Protection, 2000
Demand and facility needs (1997 and 2010) selected recreation activities, treasure coast (SCORP region X)

In summary, Treasure Coast Region (Region X) ecosystems support a significant amount of outdoor recreation in the LEC of Florida. A significant portion of the expenditures comes from tourists. As can be seen from the table above, the activities that have a lack of supply for recreation purposes are hiking, freshwater fishing, and bicycle riding.

3.15 LAND USE

Palm Beach County and the southeastern coast of Florida are anticipated to undergo continuing conversion of remaining undeveloped and agricultural lands to mixed use commercial and residential and urban uses between now and 2060. The future without-project condition is based on the prevailing pattern of land-use change over time throughout southern Palm Beach County. Between 2000 and 2003, two farms adjacent to the Winsberg tract have been converted to residential developments. This is consistent with the historical pattern of land development in the area. Natural areas are typically cleared and converted to agricultural production. Presuming development would parallel that of similar large tracts in this part of the county, it is projected that the land would be converted to a residential development, leaving no more than a nominal percentage of the tract "preserved." It is entirely likely that offsite mitigation would be sought by a developer in light of the high unit-value of lands in this area. For this reason, it is projected that the entire 150-acre tract would be developed and that no native wetland or upland habitat would be realized by the year 2060.

This projection is consistent with the land-use description found in the Palm Beach County Master Plan for the year 2020; a built-out condition by 2020 would be expected to persist through 2060 and beyond. Based on this

assessment, comparing the future without-project condition to the other with project conditions or alternatives, the future without-project or the no action alternative will result in the most adverse impact in terms of deep-well-effluent disposal volumes, amount of increase in runoff and stormwater nutrient loading to the regional canal system, influence on increased potable water demands and wastewater generation, and any number of other metrics tied to human population increases. It will have no measurable potential for any substantive function in terms of increased habitat value to resident or migratory species, or for any threatened or endangered species protected at the state or federal level.

Palm Beach County developed a 1989 Comprehensive Plan. In the Future Land-Use Element, it was the goal of Palm Beach County to establish a Managed-Growth Tier System that recognizes the diverse communities that share common characteristics within the county. Each of these communities requires specific policies to create and maintain quality livable communities respecting the lifestyle choices for current residents, future generations and visitors. Palm Beach County recognizes five (5) geographic regions (tiers), each of which exhibits distinctive physical development patterns with different needs for services to ensure a diversity of lifestyle choices. The five (5) tiers are:

1. Urban/Suburban Tier
2. Exurban Tier
3. Rural Tier
4. Agricultural Reserve Tier
5. Glades Tier

The Managed-Growth Tier Map, as shown in **Figure 3-3**, defines distinct geographical areas within the county that currently either support or are anticipated to accommodate various types of development patterns and service delivery provisions that, together, allow for a diverse range of lifestyle choices, and livable, sustainable communities. As seen on the map, the Winsberg Farm Wetlands site lies within the Urban/Suburban Tier.

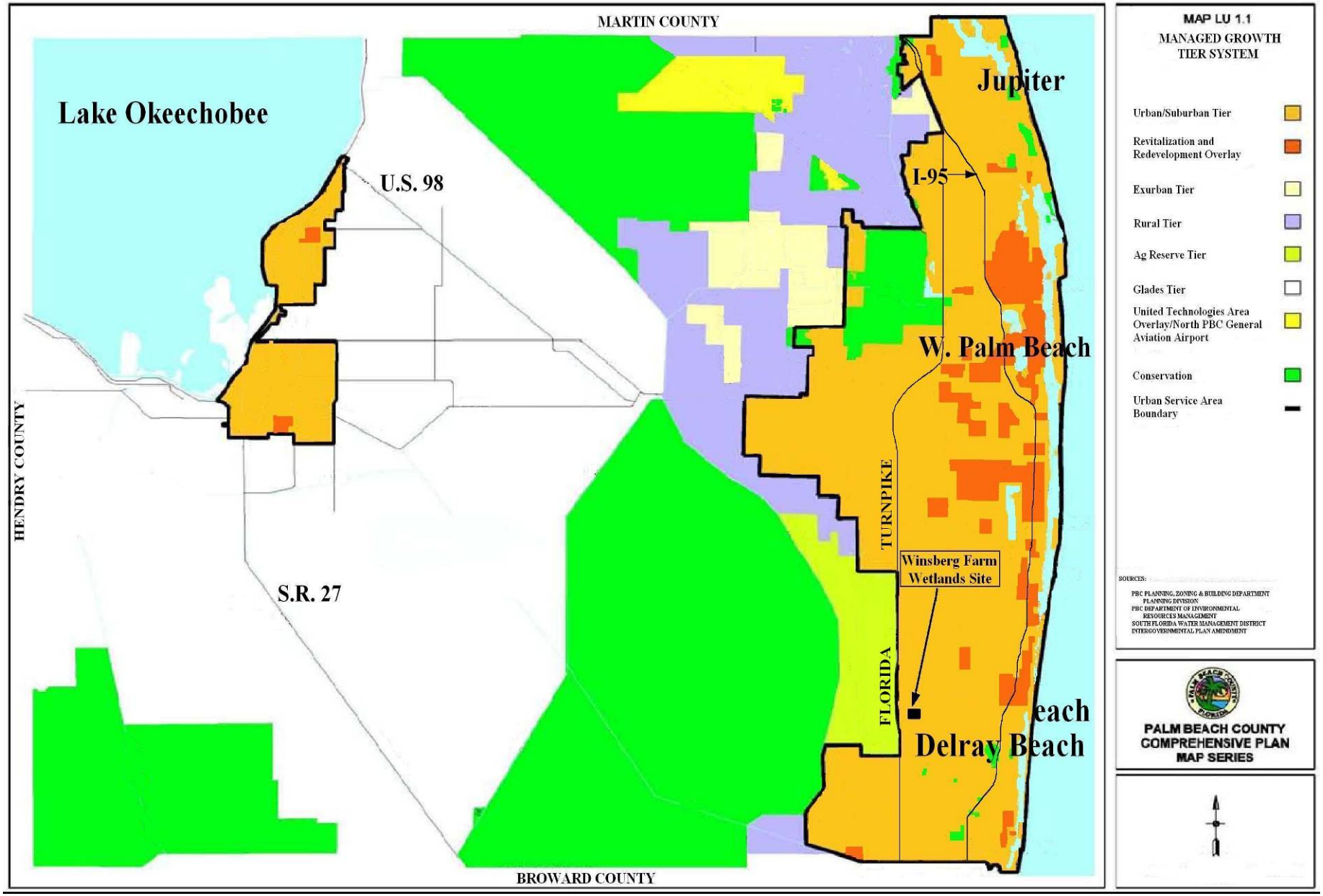

FIGURE 3-3: PALM BEACH COUNTY MAP – MANAGED GROWTH TIER SYSTEM

3.16 SOCIOECONOMICS

Population in Palm Beach County is expected to increase over 90% percent from 2000 to 2050, while population in Broward County is estimated to increase 82% during that same time period. Florida, as a whole, is projected to grow 86% by 2050. These population estimates can be viewed in **Table 3-4**. The projected growth of the South Florida Nine-County area is anticipated to be 78% over the 50-year period. An accurate estimate of future population in Census Tract 77.35, block 2, is unattainable.

TABLE 3-4: PALM BEACH & BROWARD COUNTY POPULATION ESTIMATES 2000-2050 (1,000)

Area	2000	2010	2020	2030	2040	2050
Florida	15,982.4	18,866.7	21,792.6	24,528.6	27,118.7	29,714.5
Broward County	1,623.2	1,931.6	2,257.1	2,562.9	2,754.8	2,947.0
Palm Beach County	1,131.2	1,371.2	1,622.4	1,859.2	1,998.4	2,137.9

Source: BEBR Projections, U.S. Census (2000)

3.17 AESTHETICS

The future without condition is the same as the existing condition, except that suburban development west of the urban core is expected to continue and intensify, reducing the acreage of open, green agricultural areas and sparsely-developed rural areas.

3.18 HTRW

The future without condition is the same as the existing condition.

3.19 NOISE

The future without condition is the same as the existing condition.

3.20 CULTURAL RESOURCES

The future without condition is the same as the existing condition.

SECTION 4
IDENTIFICATION OF PROBLEMS AND OPPORTUNITIES

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4.0 IDENTIFICATION OF PROBLEMS AND OPPORTUNITIES

4.1 STATEMENT OF PROBLEMS AND OPPORTUNITIES

Problem statements are descriptions of existing undesirable or objectionable conditions. Opportunities are future desirable conditions. They are descriptions of what could or should be. The lists of problems and opportunities for the Winsberg Farm Wetlands Restoration project were developed from several sources, including the LEC plan, the Yellow Book/CERP and coordination with Palm Beach County, USFWS, FL DEP, USEPA, other resource agencies, the public, environmental groups, agriculture, industry, neighborhood groups, and Friends of Wakodahatchee.

4.1.1 Problems

1. Loss of wildlife habitat in eastern Palm Beach County due to development for agricultural, residential, commercial, industrial or transportation uses;
2. Water consumption is growing as the human population continues to grow;
3. Over-drainage of the historic Everglades: Much water has been and is being taken out of the natural system (surface and ground water) by various surface drainage systems (C&SF and other);
4. Water-quality limitations of reuse water: Nutrient levels of reuse water produced by the SRWRF are such that it cannot be released to surface-water bodies or the surficial aquifer; and
5. Water-quality concerns associated with deep-well injection.

4.1.2 Opportunities

1. Retain for the natural system some of the approximately 34 MGD of treated water Palm Beach County's SRWRF that is currently disposed of by deep-well injection;
2. Convert developed but relatively open agricultural land to replicate a more natural wetland condition.
3. Create habitat to allow populations of native wildlife to re-establish;
4. Increase water supply to meet consumptive water demand and create ecosystems; and
5. Provide high-quality environmental education experiences. This would complement and/or expand the educational features of the Wakodahatchee Wetlands.

4.2 PLANNING OBJECTIVES AND CONSTRAINTS

Planning objectives are more specific than general planning goals. Planning objectives come from the problems and opportunities statements and the planning goal. The objectives are the specific items to be accomplished by the project. They give direction to developing alternatives to address identified problems of the study area. Project-specific objectives elaborate and expand on the broad goal of creating wetlands at the Winsberg Farm site.

This section of the report contains statements of objectives for Winsberg Farm Wetlands Restoration. These objectives were developed from the CERP goals and objectives and a more sub-regional and site-specific consideration of problems and opportunities. The PDT prepared several statements of project objectives. The final list reflects a focusing of project objectives as those evolved during the study. Documentation sources include the 1999 C&SF Comprehensive Review (Yellow Book, CERP), the March 2003 Draft Winsberg Farm Project Management Plan, and the minutes of several PDT meetings and workshops.

Objective 1: Create wetlands in eastern Palm Beach County. Created wetlands would provide groundwater recharge, and maintain water quality prior to discharge to natural systems or other users.

Performance Measures: Wetland functional assessment score, WRAP assessment method will be used to evaluate the quality of the wetlands created.

Objective 2: Increase wildlife habitat. The use of the created site by regional and migratory wildlife can be improved by varying topographic contours and interspersing patches of marsh, upland and forest habitat, and by creating isolated islands of native swamp forest and hardwood hammock habitat associated with deeper open pools. These habitat types have been shown at Wakodahatchee Wetlands and similar sites to support perching and nesting of both wading and migratory birds, and as basking habitats for alligators and turtles. The dense, adjacent development, the secure habitat of Winsberg Wetlands and the proximity to Wakodahatchee Wetlands will increase the value of the site to wading birds and their abundant prey base.

Performance Measure: The proximity of the Winsberg Farm project to the existing Wakodahatchee Wetlands may increase overall wildlife usage by creating an island and corridor of native habitat within the developed area. Wildlife surveys will be conducted to evaluate the number and type of wildlife inhabiting and using the Winsberg wetlands.

4.2.1 Planning Constraints

Constraints include legal and regulatory requirements that must be met and actions that should be avoided. Constraints may affect what management measures or plans are considered. While the goal of this restoration project is to restore a more natural hydrologic regime, several planning constraints were considered during plan formulation.

Three constraints are written into the law authorizing CERP, of which Winsberg Farm restoration is a component. Section 601 of the Water Resources Development Act (WRDA) 2000 (PL 106-541), subparagraph (h)(5), presents the Savings Clause. The Savings Clause requires that CERP project implementation will not adversely impact pre-existing beneficiaries or users of water resources, or beneficiaries of the existing Central and South Florida project.

Section 601(h)(5)(A) refers to existing users:

A. *(A) NO ELIMINATION OR TRANSFER -- Until a new source of water supply of comparable quantity and quality as that available on the date of enactment of this Act is available to replace the water to be lost as a result of implementation of the Plan, the Secretary and the non-federal sponsor shall not eliminate or transfer existing legal sources of water, including those for*

(i) an agricultural or urban water supply;
(ii) allocation or entitlement to the Seminole Indian Tribe of Florida under Section 7 of the Seminole Indian Land Claims Settlement Act of 1987 (25 U.S.C. 1772e);
(iii) the Miccosukee Tribe of Indians of Florida;
(iv) water supply for Everglades National Park; or
(v) water supply for fish and wildlife

Section 601 (h)(5)(B) states:

B. *(B) MAINTENANCE OF FLOOD PROTECTION -- Implementation of the Plan shall not reduce levels of service for flood protection that are:*

(i) in existence on the date of enactment of this Act; and
(ii) in accordance with applicable law.

Section 601(h)(5)(C) states:

C. *NO EFFECT ON TRIBAL COMPACT -- Nothing in this section amends, alters, prevents or otherwise abrogates rights of the Seminole Indian Tribe*

of Florida under the compact among the Seminole Tribe of Florida, the state, and the South Florida Water Management District, defining the scope and use of water rights of the Seminole Tribe of Florida, as codified by Section 7 of the Seminole Indian Land Claims Settlement Act of 1987 (25 U.S.C. 1772e).

Project lands are not in adjacent to Seminole tribal lands, and project implementation will not have an impact on the water rights of the Seminole Tribe or the Tribal Compact.

Threatened and Endangered Species

As discussed in **Section 2.1.4**, several federally listed threatened and endangered species occupy lands in the Winsberg Farm region. A federal project must not adversely affect any listed species and consultation on Endangered Species has been concluded with FWS for this project.

Florida Statutes

There are several Florida statutes and administrative rules, listed below, with which the project must comply.

- Ch. 62-302, Florida Administrative Code (FAC) Standards for Surface-Water Quality;
- Ch. 62-600, FAC, Standards for Groundwater Quality, Domestic Wastewater;
- Ch. 62-610, FAC, Standards for Reclaimed Water and Land Application Systems;
- Ch. 62 520, FAC, Standards for Groundwater Quality;
- Regulations for Discharges under the Underground Injection Control Program (UIC), Ch. 62-528, FAC; and
- Regulations for Discharges to Man-Made Wetlands, Ch. 62-611, FAC.

The effluent from the SRWRF is currently in compliance with all applicable State of Florida water quality requirements. Pertinent details and application of each of these regulations are included in **Appendix C,** "Environmental and Cultural Resources Information", Section C.4.

SECTION 5
*FORMULATION OF ALTERNATIVE PLANS

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5.0 FORMULATION OF ALTERNATIVE PLANS

5.1 PRIOR FORMULATION FROM THE YELLOW BOOK

In 1999, USACE completed the Central and Southern Florida (C&SF) Project Comprehensive Review Study (a.k.a. "Restudy"). The purpose of the Restudy was to reexamine the C&SF Project to "determine the feasibility of structural or operational modifications to the project essential to the restoration of the Everglades and the South Florida ecosystem, while providing for other water-related needs such as urban and agricultural water supply and flood protection in those areas served by the project" (WRDA 1996). The intent of the study was to evaluate conditions within the South Florida ecosystem and make recommendations to modify the C&SF project to restore important functions and values to the Everglades and South Florida ecosystem and plan for the water resources needs of the people of South Florida for the next 50 years.

The Plan that was developed as a result of the Comprehensive Review Study is known as the Comprehensive Everglades Restoration Plan (CERP). The CERP contains 68 components that have been combined into multiple projects that, when implemented, will work together to achieve the Plan's goals. The 68 components of CERP were formulated so that the plan as a whole would achieve its objectives. Few, if any, of the individual components attempt to address all CERP objectives.

Chapter 9 of the Comprehensive Review Study Report includes a description of the purpose and features of each of the 68 components. The text for Winsberg Farm follows:

"9.1.8.5 Winsberg Farms Wetland Restoration (OPE)

This feature includes the construction of a 175-acre wetland east of Loxahatchee Wildlife Preserve in Palm Beach County. The feature will reduce the amount of treated water from the Southern Region Water Reclamation Facility wasted in deep injection wells by further treating and recycling the water The purpose of this facility is to create a wetland from water, which would be normally lost to deep well injection and any future beneficial use. The wetland will reuse a valuable resource, recharge the local aquifer system, create a new ecologically significant wildlife habitat and extend the function of the nearby Wakodahatchee Wetland." (Yellow Book, Pages 9-15)

The Plan, including the Winsberg Farm project, was approved in WRDA 2000 as a framework for the restoration of the South Florida ecosystem. In accordance with the requirements of WRDA 2000, most CERP projects require subsequent authorization by Congress; however, the Secretary of the Army may authorize

smaller CERP projects, including Winsberg Farm, under the CERP program authority without additional Congressional authorization.

5.2 PLAN FORMULATION RATIONALE

The planning process used by the Winsberg Farm project delivery team (PDT) reflects a frequently used six-step model (Planning Guidance Notebook, ER 1105-2-100). These steps are:

1. Identify problems and opportunities;
2. Inventory and forecast of resources;
3. Formulate alternative plans;
4. Evaluate plan effect;
5. Compare effects of alternative plans; and
6. Select the recommended plan.

The first step, Identifying Problems and Opportunities, is discussed in Section 4 of this report. Step 2, Inventory and Forecast of Resources, is covered in Sections 2 and 3 of this report. Specifically, these sections discuss existing resources and forecasted future conditions if no federal project is implemented. Steps 3 through 6 are addressed in this section of this report.

This chapter starts by describing the processes used to develop the Winsberg Farm alternatives. This section also includes a detailed presentation of alternatives, their components, and the tools that were used to evaluate the alternatives. It then presents the evaluation of alternatives by assessing their effects versus the future without-project conditions. Lastly, this section compares the alternatives against each other and identifies the recommended plan.

The planning process description above is presented as a simple sequence of six steps. However, planning for the Winsberg Farm project was very much an iterative process. Steps were repeated as new information became available, as evaluation tools improved, and as new ideas were tried during the study team's efforts to increase restoration benefits and reduce costs. The details of the plan formulation process are provided in the discussions that follow in this section.

5.2.1 Formulation Process: The Programmatic Regulations

Due to its small size and negligible impact on the regional water management system, for planning purposes, the Winsberg Farm project is considered to be hydrologically separate from other CERP components.

The Programmatic Regulations for CERP (33 CFR, Part 385) and the Draft CERP Guidance Memorandum on Formulation and Evaluation Procedures both

address new procedures unique to CERP project implementation. These procedures, including system formulation and next-added incremental analysis, were developed, in part, because of the significant hydrologic interconnectedness, dependencies and geographic overlaps among many planned CERP components (projects), particularly in southeast Florida, where the individual components would be implemented over many years.

In accordance with the general requirements of the Programmatic Regulations, alternative plans for CERP projects are evaluated and selected based on their contributions to the system of projects that comprise the CERP. This is accomplished by incorporating individual project alternatives with the remaining features of the Comprehensive Plan to determine the magnitude and spatial extent of project benefits resulting from synergistic effects. A next-added increment analysis is used to justify project implementation and identifies those benefits to the South Florida ecosystem attributable to the project if it is the only CERP project implemented.

However, since the Winsberg Farm project is a relatively small-scale project and is essentially no hydraulic effect on the regional water management system, all plans for the Winsberg Farm were assumed to be equivalent from a system formulation perspective. Therefore, plan selection was based on a comparison of next-added incremental environmental benefits to the future without-project condition.

5.2.2 CERP Guidance Memoranda

As required by the Programmatic Regulations, six draft Program-Wide Guidance Memoranda have been developed. Guidance Memorandum #1 ("Project Implementation Reports") contains the requirements for information to be included in and the format of project implementation reports (PIRs). Guidance Memorandum #2, ("Formulation and Evaluation of Alternatives for Project Implementation Reports") contains additional requirements for plan formulation, evaluation, selection, and justification.

According to the WRDA 2000 and guidance outlined in the programmatic regulations (Section 385.26), a PIR is required to implement any CERP component. The PIR is intended to bridge the gap between the conceptual level of detail contained in the Final Integrated Feasibility Report and Programmatic Environmental Impact Statement, and the detailed designs necessary to prepare plans and specifications to proceed to construction. It provides to decision-makers and the general public a well-organized, clear and concise documentation of the process the project team followed during the planning effort. Additionally, it includes an integrated National Environmental Policy Act (NEPA) document that will fully disclose anticipated effects associated with the

implementation of the alternative plans being evaluated, including the no-action alternative plan.

Unlike a Feasibility Study, each project described in a PIR was previously formulated to a certain level in the 1999 Comprehensive Review Study Report, and a recommended plan or feature was developed to accomplish specific Plan goals. As such, formulation in the PIR never begins with an entirely blank slate.

In accordance with draft Guidance Memorandum #2, "Formulation and Evaluation of Alternatives for Project Implementation Reports", initial formulation for the Winsberg Farm project was based on the conceptual description contained in the Yellow Book. The PDT considered whether the proposed project will still achieve the benefits described in the Comprehensive Review Study report in a cost-effective manner. Since the PDT determined that benefits could be obtained in a cost-effective manner on lands already acquired for the project implementation, formulation was focused on optimize project benefits and costs. Additional discussion of the reaffirmation of the Yellow Book plan for Winsberg Farm is contained in **Appendix F** Plan Formulation.

5.2.3 Summary of Plan Formulation Methodology

Since it was reaffirmed that the Winsberg Farm project described in the 1999 Comprehensive Review Study report (which is to construct a wetland on the Winsberg site) would still achieve benefits in a cost-effective manner, formulation focused on optimizing the design, operation, cost, and benefits for the Winsberg Farm Wetlands Restoration Project. To evaluate cost effectiveness, a constructed wetland at the Winsberg site was compared to other sites in the study area, was evaluated for cost-effectiveness. After verifying and selecting the Winsberg site as cost-effective, alternatives were then developed and refined to optimize the design of a constructed wetland on the Winsberg site.

5.3 ALTERNATIVE PLANS

Prior to reaffirming that the Winsberg Farm project would provide benefits in a cost-effective manner, USACE and USFWS team members considered two approaches to develop alternatives. In the first approach, alternatives were developed, in conjunction with the USFWS team member, as follows: The team recommended designing a suite of alternatives based upon 1) a varied number of wetland cells, 2) the presence or absence of a buffer cell, and 3) an available source of water. A buffer cell would be designed for treatment.

The second approach was developed by CH2MHill under contract with USACE, Jacksonville District. This approach involved a number of different hydroperiod designs for the site. The two initial approaches are discussed in detail in **Appendix F** of this report.

In evaluating both approaches, it was noted that all of the initial alternatives developed and listed below are various combinations of the basic management measures.

The approach that was ultimately used for alternative development was to reaffirm the Winsberg Farm site and plan from the Comprehensive Review Study report. The first step in the reaffirmation process was to verify that the Winsberg Site was cost-effective, followed by optimizing the design of constructed wetlands on the 150-acre Winsberg Farm site. Accounting for interior and exterior berms, 114 acres of wetland will be created. For plan formulation purposes, 150 acres was used. After the more detailed design and surveys were completed for the TSP, the actual acreage of wetlands created will be 114 acres. See Section 1.5 for a detailed breakdown of the acreages.

5.3.1 Wakodahatchee Wetlands

The Wakodahatchee Wetlands is owned and operated by the Palm Beach County Water Utility District (PBCWUD) and was a model for the Winsberg Farm study. The Wakodahatchee Wetlands is a constructed wetland, and receives secondary treated wastewater from the SRWRF. Design and operational details of the Wakodahatchee Wetlands were used to develop constructed wetland alternatives for the Winsberg Farm study.

5.3.2 Site Selection/Reaffirmation of the Winsberg Site

The following sections describe the site selection processes for comparison purposes, evaluation criteria, and the conclusions from the project component siting comparison.

5.3.2.1 Properties

There were four properties (Winsberg, McMurrain, York, and Bowman) used to confirm the cost-effectiveness of constructing a wetland utilizing treated wastewater at the Winsberg Farm site. These sites are all undeveloped county-owned properties located near the water treatment plant. In keeping with CERP Programmatic Guidance, the actual real estate cost of the Winsberg property was used, as well as the purchase costs of the other properties, so as to arrive at a valid comparison. **Figure 5-1** displays map sites for various alternative locations.

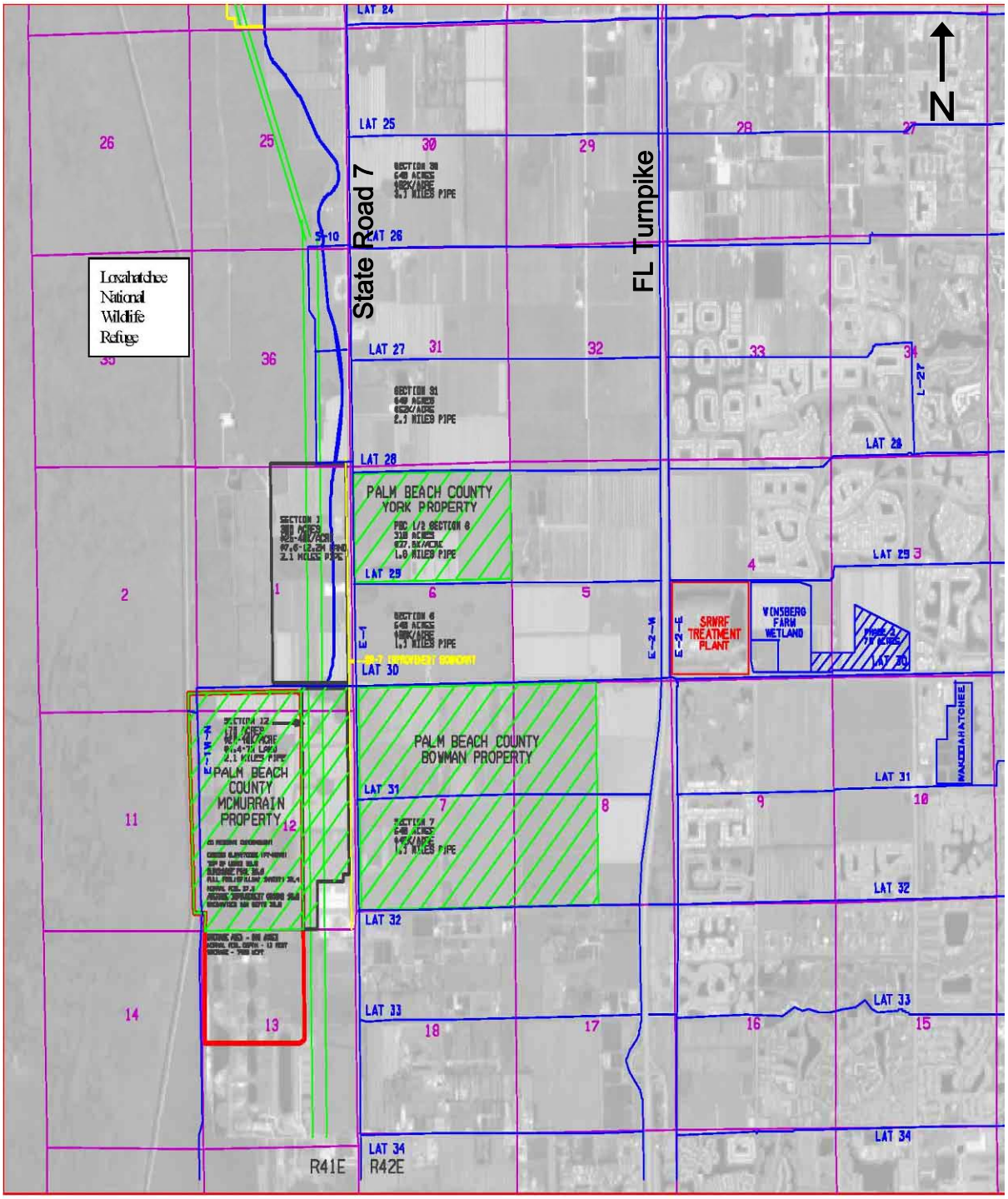

FIGURE 5-1: ALTERNATIVE LOCATIONS

5.3.2.2 Costs and Benefits

Cost variations for the various sites stem from differing real estate and construction (distribution piping) costs, which vary according to distance from

the treatment plant. Benefits for the site selection process are all considered to be exclusive of the chosen site. All properties would have similar benefits, so the cost-effectiveness determination was made only on costs alone. The plan with the lowest annual cost is the only cost-effective plan.

Table 5-1 presents the results of the cost-effectiveness analysis for the Winsberg Farms alternative plan. The table shows that only the Winsberg property is cost-effective. Since all sites provide similar benefits, the lowest-cost plan is the only one that is cost-effective. All other alternative plans show significantly higher costs, clearly showing that the Winsberg site will provide the same output for less cost.

TABLE 5-1: COSTS USED IN COST-EFFECTIVENESS FOR SITE SELECTION

Winsberg Farms Wetland Matrix	Winsberg	McMurrain	York	Bowman
Lands	$2,390,500	$5,521,800	$5,625,000	$6,159,150
Construction	$6,432,000	$7,214,000	$6,714,000	$6,214,000
Total First Cost	$8,932,000	$12,735,800	$12,339,000	$12,373,150
IDC Real Estate	$161,677	$373,456	$380,436	$416,152
IDC Construction	$215,130	$241,286	$234,960	$207,839
Total Investment	$9,199,307	$13,350,542	$12,954,396	$12,997,141
Annual Equivalent	$533,381	$774,073	$751,104	$753,582
O&M (yrly)	$140,000	$140,000	$140,000	$140,000
VegMon (yrly)	$11,370	$11,370	$11,370	$11,370
Average Annual Cost	$684,751	$925,443	$902,474	$904,952
Cost Effective?	YES			

5.3.3 Development of Management Measures

A management measure is a feature or activity that can be implemented at a specific place to address one or more planning objectives or constraints. Features are usually structural measures and often require construction or assembly. Activities are usually nonstructural measures and often are actions, procedures or policies that affect actions or procedures. Management measures are the building blocks of alternative plans. Measures for Winsberg Farm were developed to meet at least one of the planning objectives and to avoid constraints. Each measure is briefly addressed in the list below:

1. Deliver water from SRWRF to restoration site;
2. Pump water from Wakodahatchee Wetlands to restoration site;
3. Pump water from L-30 or L-29 canals to restoration site;

4. Pump water from aquifer to restoration site;
5. Construct levee around perimeter of restoration site;
6. Construct levees through middle of restoration site to subdivide the area into cells;
7. Install trees;
8. Install shrubs;
9. Install emergent aquatic plants;
10. Install submerged aquatic plants;
11. Construct dry areas adjacent to wet areas;
12. Construct shallow-water areas;
13. Construct deep-water areas;
14. Construct for seasonal fluctuations of water depth;
15. Install valves or construct weirs to control water between cells;
16. Construct discharge corridor to L-30 Canal;
17. Construct discharge mechanism to groundwater;
18. Install lining to prevent groundwater discharge;
19. Install partial lining to reduce the rate of groundwater discharge;
20. Construct exterior containment dike to capture overflow or leak from wetland area;
21. Construct cell (STA) between SRWRF and wetland restoration site for nutrient removal; and
22. Install additional water-quality treatment area within SRWRF prior to delivery to restoration site.

5.3.4 Objective vs. Measures Matrix

Table 5-2 summarizes the relationships between the planning objectives and each of the management measures. The table illustrates the planning objectives and constraints that are addressed by each of the management measures.

TABLE 5-2: PLANNING OBJECTIVES AND CONSTRAINTS

	Objective	Objective	Objective	Constraint
	Increase water	Create wetlands	Increase wildlife habitat	Meet WQ standards
Deliver water from SRWRF to restoration site	X	X		
Deliver water from Wakodahatchee to restoration site	X	X		X
Deliver water from L-30 or L-29 to restoration site		X		
Deliver water from aquifer to restoration site		X		
Levee around perimeter of restoration site		X		X
Levee(s) through middle of restoration site to subdivide the area into cells		X	X	
Install trees		X	X	
Install shrubs		X	X	
Install emergent aquatic plants		X	X	X
Install submerged aquatic plants		X	X	X

Dry areas adjacent to wet areas			X	
Shallow water areas		X	X	
Deep water areas		X	X	
Seasonal fluctuation of water depth		X	X	
Valves or weirs to control water between cells		X	X	
Discharge to L-30 Conveyance	X			
Discharge to groundwater	X			X
Lining to prevent groundwater discharge		X		X
Partial lining to reduce the rate of groundwater discharge		X		X
Exterior containment dike to capture overflow or leak from wetland area				X
Additional water quality treatment within SRWRF prior to delivery to Winsberg	X	X	X	X
Cell (STA) between SRWRF and wetland restoration site for nutrient removal		X	X	X

* Planning Objectives and Constraints Addressed by Each Management Measure

5.3.5 Management Measures Evaluation and Screening

The following is a broad description of the management measures considered by the Project Delivery Team (PDT), with measures grouped in six areas described above. The rationale for eliminating certain measures prior to alternative formulation is included where appropriate.

It was noted that all of the initial alternatives developed and listed above are various combinations of basic management measures. In developing this array of alternatives, management measures were sorted into four general groups listed below:

1. Water source
2. Pretreatment
3. Wetland design
   a. Number of cells
   b. Depth of cells
   c. Wetland hydroperiod
   d. Habitat mosaic
4. Discharge

5.3.5.1 Source Water

Several potential water sources exist for the constructed wetland system: surface water (Lake Worth Drainage District [LWDD] canal), the surficial aquifer, rainfall or the SRWRF (directly from the facility or via the Wakodahatchee Wetlands). While each of these options demonstrates potential for use in wetland creation/restoration, all of the water sources except SRWRF deliveries directly to the wetland site were screened prior to optimization.

One of the project objectives is to increase the quantity of available water. Using surface water from the L-30 Canal or the drinking water aquifer for created wetlands merely moves the location of water and reduces water availability to other users. Water for environmental restoration purposes is typically needed throughout the year, including water shortage periods. Water from the canal or drinking water aquifer is under greater demand during drought conditions, thus increasing potential competition for the water. Water from the SRWRF is available 100 percent of the time and does not compete with existing-user allocations, rights or consumptive use permits.

Water from the surficial drinking water aquifer is higher in chlorides and although the nutrient quality is good, the chlorides cause problems with restoration vegetation and amphibian species.

Rehydration of the proposed wetland with either rainfall or the surficial aquifer was rejected as incompatible with the objective of increasing the availability of freshwater for the region. While the use of surface water currently lost to tide would be compatible with the aforementioned objective, this option was discounted as costly and impractical since it would require an impoundment to regulate input to the wetland system throughout the year.

Discharges of wastewater are regulated under the National Pollutant Discharge Elimination System (NPDES) Program. The state of Florida regulates this under Florida Administrative Code (FAC) Chapters 62-600, 62- 302, 62-520 and 62-610. These chapters detail standards and requirements for wastewater plants (62-600), surface water standards (62-302), groundwater (62-520), and wastewater reuse systems (62-610), respectively. Wastewater discharges to surface water must meet surface-water standards. Wastewater discharges to aquifers must meet drinking-water standards. Due to the high WQ standards and assimilative capacity of waterways, most wastewater plants do not discharge to surface waters. Similarly, treated wastewater is not discharged to surficial aquifers. These standards prevent wastewater plants from discharging to natural wetlands.

In most reuse applications, discharges are restricted to constructed wetlands. The Wakodohatchee is such a constructed wetland, and Winsberg Farm is proposed to be likewise. These discharges are regulated under FAC 62-610. Prior to discharge, these reuse facilities must meet established requirements for nutrients, pathogens and toxic removal. Reuse facilities require advanced disinfection and filtration prior to discharge. Constructed wetlands are designed so that the assimilative capacity for nutrients is not exceeded.

As a permitted and regulated facility, the SRWRF meets these referenced standards. It is an advanced secondary plant that provides removal of BOD, suspended solids, pathogens and some nitrification. It has two wastewater effluent filters and post disinfection that it employs for water discharged to the Wakodahatchee Wetlands. Winsberg Farm will receive effluent from these filters, as well as post disinfection.

The SRWRF consists of typical process features designed to produce a high-level, secondarily treated effluent (bar, grit chamber, aeration-nitrification basin [for step aeration-activated sludge treatment], and clarifier with a reclamation feature that consists of a filtering system where high-level disinfection occurs). Treated secondary effluent from SRWRF meets all primary/secondary drinking-water standards except for odor and color.

A detailed discussion of water quality provided by the SRWRF and a case history of two constructed wetlands is included in the **Appendix C** Environmental Information and NEPA.

The possibility of delivering water to the wetland creation/restoration site from the SRWRF via the Wakodahatchee Wetlands was included based on the concept that the receiving system at Winsberg Farm would benefit from water-quality improvement realized at Wakodahatchee. This concept was ultimately rejected for several reasons. First, the Wakodahatchee Wetland site was not designed to hydraulically pass the volumes of water estimated as needed to meet the hydrologic needs at approximately 114-acre Winsberg Farm wetland system, which was the minimum-sized project the PDT was considering. The size and design of Wakodahatchee would therefore have to be modified (which translates into a cost increase), or the biological system would be overstressed and result in virtually untreated flow. Furthermore, a modification to the existing Wakodahatchee permit would be required. Such a modification would likely require additional monitoring and a system redesign (i.e., capacity increase). Furthermore, it is questionable whether or not any water quality improvement to additional flow would actually occur. Ultimately, it was concluded that wastewater from the SRWRF is the best source of water for the project.

5.3.5.2 Pretreatment

Two options were explored for additional treatment of the water from the SRWRF prior to discharge to the created wetlands: the inclusion of an on-site stormwater treatment area (STA) designed for water-quality improvement in the project area and additional pretreatment at the SRWRF. In general, the advantages to additional treatment of the already-treated wastewater are that the effluent would be less likely to adversely impact impaired canal surface waters (if discharge to surface water was desired or were to occur) and it would

allow for the creation of low-nutrient habitat for wildlife on the project site. However, each treatment option was rejected. The inclusion of an STA, which is essentially a vegetated marsh optimized for water quality treatment, was dismissed because it reduced the amount of space available for creating desirable wildlife habitat and provided less open water for fish and to attract aquatic birds. Such a system would not have areas expressly set aside for fish habitat or bird nesting and roosting, and would require a significant part of the site for treatment of even the minimum flows required for site hydration. As a result, the project would not meet a major objective of maximizing wildlife use.

Additional pretreatment at the SRWRF was also rejected as cost prohibitive. System augmentation for advanced treatment would involve constructing facilities for nitrification and denitrification, requiring significant capital outlays for the facility (tens of millions of dollars). Additionally, the team evaluated habitat quality at the Wakodahatchee Wetlands, and the quality of the groundwater from on-site monitoring wells. These wetlands use the same water from the SRWRF without additional pretreatment, and the groundwater monitoring data from that site shows no adverse impact to groundwater quality. Additionally, the functional value of the wildlife habitat at the Wakodahatchee site is high. Therefore, it was decided that pre-treatment of the water was not needed.

5.3.5.3 Destination of Water Leaving Constructed Wetlands Site

To address concerns about off-site impacts, the facility could be completely lined to prevent seepage or discharge, leaving evapotranspiration as the only means for water to leave. This would prohibit meeting Objective 1, to add water for other users. Water from the wetland could possibly be discharged to deep well, but this is one of the actions that the project is attempting to reduce. In order for water in the created wetland to become available for other users, it would have to be released from the wetland to surface water or groundwater. This decision is closely tied to the extent of water pretreatment before introducing it to the wetland, the water quality of the discharge and whether a permit can be obtained. Since L-30 Conveyance is on the 303(d) list of impaired waters, it may be very difficult to obtain a permit to discharge to this surface water.

The existing wetland, Wakodahatchee, is functioning well. Percolation to the shallow aquifer is considered beneficial, as this water generates a project benefit and gives it a higher capacity to accept treated process water. Groundwater data from Wakodahatchee Wetlands determined no adverse impact from the use of secondary effluent. As discussed, based on the experience at the Wakodahatchee Wetlands, it has been estimated that about 25-50 percent of the water delivered exits as percolation and the rest (about 50-75 percent) is lost to evapotranspiration. Sealing or lining the cell or cells would decrease the

benefits of the project in terms of aquifer recharge. Therefore, sealing or lining the cell or cells is not a viable management measure.

5.3.5.4 Wetland Design

Assorted management measures associated with the design of the wetland system were discussed by the PDT, including varying the number and depth of cells, the hydroperiod of the wetland, and the habitat (species composition) mosaic.

5.3.5.5 Cell Number

The PDT recognized that multiple cell use allows for operational flexibility and would enable facility operators to maintain optimal water stages for water quality purposes by promoting contaminant settling in the water column and entrapment at the sediment layer. A total of 4 cells, 2 in each half of the project area, were used because more than that would require additional berms and would reduce the acreage of wetlands and increase the cost, without any additional operational advantage. Having 4 cells will allow one cell to be taken out of service for maintenance and only impact a small portion of the wetland.

5.3.5.6 Cell Depth

Water levels, largely resulting from the depth of the wetland cell(s), will impact plant community establishment and composition, wildlife usage, water quality improvement processes, and the amount of water delivered to the site (and consequently the amount of water returned to the local system). However, it was recognized that variations in cell depth would be addressed indirectly through the PDT's efforts to evaluate combinations of deep water, wetland and upland habitats for the system (i.e. habitat mosaics). Therefore, to avoid duplication, it was determined that cell depth would be more appropriately addressed in the context of alternative habitat mosaics, which is discussed below.

5.3.5.7 Wetland Hydroperiod

The hydroperiod (duration on inundation and seasonal fluctuations) of the wetland system will also have implications for plant community establishment and composition, wildlife usage, water quality improvement, and the amount of water delivered to the site. The PDT explored using long, intermediate and short-hydroperiod wetlands in system design. Long-hydroperiod wetlands were included to reflect the hydrologic regime of the Wakodahatchee Wetlands, a nearby, functioning, wetland constructed by Palm Beach County. Short-hydroperiod wetlands were considered because they are perhaps more representative of the wetland communities that existed in the project vicinity prior to human disturbance. However, considerably less water could be delivered

to a short-hydroperiod wetland, limiting project benefits. Intermediate hydroperiod wetlands were considered because they contained some of the benefit of both the long and the short hydroperiod wetlands. All three hydroperiods were evaluated in the Section 5.6.2 - Plan Optimization Using Cost-effectiveness and Incremental Cost Analyses (CE/ICA).

5.3.5.8 Habitat Mosaic

A nearly infinite combination of plant species vegetation mosaics, number and location of deep pools, and alignment of berms to divide the total area into cells or ponds could be proposed. It has been suggested that the project use the guidelines developed through interagency consultations with the U. S. Fish and Wildlife Service (FWS) for the Acme Basin B (CERP project) study. FWS's recommendations are that 30 percent of the area should be dry or upland area and 70 percent should be wet area. Within the wet area, 10 percent should be deep areas to function as fish refugia and 90 percent should be shallow, littoral zones characterized by emergent vegetation. These are also similar to the mix of zones used in the Wakodahatchee Wetlands. Another suggestion is that the project should use the historic characteristics of tree islands in the historic ridge and slough Everglades, where uplands comprised between 2 percent (Water Conservation Area 3) and 14 percent (ARM Refuge) of the area.

The alternatives would generally conform to an assemblage of different habitat types that include shallow emergent marsh, deep water zones and sloughs, tree islands and forested wetlands. Species composition for each alternative will be similar. Native species will be planted at elevations appropriate for their hydrologic tolerance and configured to maximize wildlife benefits.

Alternatives would allow for seasonal dry-downs in the shallow emergent marsh zones to enhance plant communities and wildlife habitat. Dry-downs would help with native plant regeneration, muck and flock consolidation to slow soil accretion rates, and would concentrate fish in sloughs and deep water areas to enhance wading bird foraging. There would be a trade-off between the duration of dry-downs and the rate of groundwater recharge, but enhancing the habitat through occasional dry-downs helps achieve all of the other objectives for this project.

5.3.5.9 Discharge

Several options were considered regarding the destination of water from the wetland creation/restoration site, including releasing water to a deep injection well, to surface water (Wakodahatchee Wetlands or a LWDD canal), or to the surficial aquifer (through seepage). The PDT recognized that discharge would have important implications for the project's ability to positively influence the regional hydrologic condition, and therefore attempted to consider a range of

possibilities. The combination of the project objectives and water quality constraints resulted in screening two of the discharge options from further consideration. First, deep injection was rejected as an option since it is an activity that the project is specifically trying to reduce.

Second, while benefits of discharging to the Wakodahatchee Wetlands potentially exist (discharge to an established system, one discharge zone for the surrounding area), this option was discarded due to permit restrictions for that site (discharge limitations, Safe Drinking Water Act MCLs, new monitoring requirements), and to avoid disrupting an already functioning system.

Discharge to a LWDD canal was likewise rejected as infeasible due to water quality constraints in the receiving basin and regulatory restrictions. The Florida Department of Environmental Protection (DEP) advised that surface discharges to LWDD canals were unlikely to be allowable because these canals are considered "water quality impaired" from pollutants present in runoff from the highly urbanized land areas in this basin. Though the proposed project does not currently consist of an alternative that includes surface water discharge, it should be noted that the L-30 conveyance, located on the southern boundary of the Winsberg property, has been 303d-listed (as Segment E-3) as an impaired water body (reference Impaired Waters Rule, 62-303, FAC). The parameters of concern for which the L-30 has been listed are coliform bacteria, nutrients, and dissolved oxygen (DO). Since Total Maximum Daily Loads (TMDLs) have not been established for the E-3 segment, the CERP general policy of not degrading receiving water bodies was adhered to for initial design and operations development purposes.

The local sponsor's position was that the nearby Wakodahatchee Wetland set a precedent for an acceptable regulatory approach. Ample groundwater monitoring records are available for the Wakodahatchee Wetland site to document that use of secondary effluent from the SRWRF for wetland rehydration has had no negative impact on the surficial aquifer at this location, and local sponsor has proposed permitting of the current project under the same rules and regulations as were applied to the Wakodahatchee Wetland site (Chapter 62-600, Florida Administrative Code [FAC]). A Water Quality Permit has been issued for Phase 1 of the Winsberg site. The permit will have to be modified to include Phase 2 of the project. It is anticipated that no surface discharge of water from the wetland will be allowed; all waters introduced to the site will leave either through infiltration to groundwater or through evapotranspiration.

With regard to surficial aquifer discharge, the possibility of lining the wetland was explored. Lining part or all of one or more cells was rejected because it was not needed. In addition, lining the cells would inhibit groundwater infiltration,

which would not meet the project objective of returning SRWRF effluent the natural system.

5.3.5.10 Education/Recreation

Educational/recreational benefits were considered secondary, and alternative plans were not formulated based on recreational management measures. The recreational feature of the project has already been constructed by the Sponsor as part of Phase 1, which was the early construction accomplished pursuant to the real estate purchase agreement.

The recreation features at Phase 1 consist of an 8,600 sq. ft. visitors center, 6,300 linear feet of boardwalk our over the wetland with 4 small covered overlooks and parking for 125 car and 10 buses. The recreation feature of the project is discussed in more detail in **Appendix H.**

5.3.6 Results of the Evaluation and Screening of Management Measures

Based on the information discussed above, the list of candidate management measures was screened to a manageable number. The following remaining measures were considered in alternative plan formulation to determine an optimal plan:

- *Site location*: Winsberg Farm
- *Source water*: Directly from the SRWRF
- *Pretreatment*: None
- *Wetland design*: Three Designs: Short-hydroperiod, Intermediate-hydroperiod and Long-hydroperiod wetlands alternatives will be evaluated; FWS recommendations on habitat mosaic to be followed.
- *Discharge*: Evapotranspiration and percolation to surficial aquifer
- *Education*: Not formulating for education/recreation

5.4 DEVELOPMENT OF ALTERNATIVES

As discussed above, all alternative plans have the same combination of management measures except the hydroperiod.

All alternatives:

- Utilize the Winsberg site;
- Use reclaimed wastewater from the county's SRWRF;
- Follow the habitat mosaic recommended by the U.S. Fish and Wildlife Service for design of the wetland;

- Discharge via evapotranspiration or percolation to the surficial aquifer.
- Have recreation features (which are not part of the plan evaluation process).

Three different hydroperiods were evaluated to fully optimize the design of the wetland. Therefore, there are three alternative plans along with the No Action alternative. See **Table 5-3**.

TABLE 5-3: LIST OF ALTERNATIVES

Alternative	Wetland Design
Alternative 1 Winsberg Farm	Intermediate Hydroperiod
Alternative 2 Winsberg Farm	Short Hydroperiod
Alternative 3 Winsberg Farm	Long Hydroperiod

5.5 EVALUATION OF ALTERNATIVES

In accordance with USACE planning guidance, alternative plans for the Winsberg Farm Wetland Restoration were formulated to meet the project objectives (increase local water resource availability for the natural systems and other users, create wetlands, increase wildlife habitat, and provide public education and recreational opportunities) while avoiding project constraints (no elimination or transfer, maintenance of flood protection, no effect on tribal compact, no adverse effect on listed species, meet surface and ground water discharge regulations).

These alternatives along with the no action alternative were carried forward into cost-effectiveness analysis.

5.5.1 Description of Alternatives

5.5.1.1 The No-Action Alternative

There would be no federal project.

5.5.1.2 Alternative 1 - Intermediate Hydroperiod Wetland

This alternative involves a wetland creation project located on approximately 175 acres of farmland just east of the Southern Region Water Reclamation Facility (SRWRF). Approximately 114 acres of the site would be hydrated using treated wastewater from the SRWRF.

The western half of the project (Phase 1) is divided by an internal levee, which creates a Cell 1 to the north and a Cell 2 to the south. Each cell water level can

be independently managed by operation of inflow gate valves and butterfly valves and outflow at control structures. Each cell has a gated control structure with a 24" RCP culvert. Phase 2, the second half of the 114 acres, will also be divided by an internal levee creating Cell 3 and Cell 4. Flow structures and pumps will be similar to Phase 1.

The source of water will be directly from the SRWRF. There will be no pre-treatment. The wetland design will be an intermediate hydroperiod wetland and will follow the FWS recommendation for habitat mosaic (see **Table 5-3**). Water levels will be allowed to fluctuate seasonally within a 1 to 2 foot range throughout the 114 acres in response to natural seasonal variation in rainfall. This variation in the depth and duration of flooding (i.e. hydroperiod) will influence the growth and distribution of plant species within the wetland. The discharge will be to the surficial aquifer and evaporation. Educational and recreational features will be included.

5.5.1.3 Alternative 2 - Short Hydroperiod Wetland

This alternative also involves a wetland creation project located on approximately 175 acres of farmland just east of the Southern Region Water Reclamation Facility (SRWRF). Approximately 114 acres of the site would be hydrated using treated wastewater from the SRWRF.

The western half of the project (Phase 1) is divided by an internal levee, which creates a Cell 1 to the north and a Cell 2 to the south. Each cell water level can be independently managed by operation of inflow gate valves and butterfly valves and outflow at control structures. Each cell has a gated control structure with a 24" RCP culvert. Phase 2, the second half of the 114 acres, will also be divided by an internal levee creating Cell 3 and Cell 4. Flow structures and pumps will be similar to Phase 1.

The source of water will be directly from the SRWRF. There will be no pre-treatment. The wetland design will be a short hydroperiod wetlands and will follow the FWS recommendation for habitat mosaic. This hydroperiod would include seasonally drier conditions than the intermediate hydroperiod. This alternative would be allowed to dry more substantially during a dry (winter-spring) season. Total water delivery from the SRWRF would be less than alternatives with continuous or deeper inundation. The discharge will be to the surficial aquifer and evaporation. Educational and recreational features will be included.

5.5.1.4 Alternative 3 - Long Hydroperiod Wetlands

This alternative also involves a wetland creation project located on approximately 175 acres of farmland just east of the Southern Region Water

Reclamation Facility (SRWRF). Approximately 114 acres of the site would be hydrated using treated wastewater from the SRWRF.

The western half of the project (Phase 1) is divided by an internal levee, which creates a Cell 1 to the north and a Cell 2 to the south. Each cell water level can be independently managed by operation of inflow gate valves and butterfly valves and outflow at control structures. Each cell has a gated control structure with a 24" RCP culvert. Phase 2, the second half of the 114 acres, will also be divided by an internal levee creating Cell 3 and Cell 4. Flow structures and pumps will be similar to Phase 1.

The source of water will be directly from the SRWRF. There will be no pre-treatment. The wetland design will be a long hydroperiod wetlands and will follow the FWS recommendation for habitat mosaic. The long hydroperiod would be provided with perennial inundation but seasonally fluctuating water levels. The discharge will be to the surficial aquifer and evaporation. Educational and recreational features will be included.

5.6 EVALUATION OF ALTERNATIVES – OVERVIEW

This final array of three alternatives was evaluated for relative cost-effectiveness and to determine which plan best met the project objectives. For each of the alternatives, environmental benefits in the form of developing habitat units were developed by using the Wetland Quality Index (WQI) method (Section 5.6.2.1). The results from both methods were combined. Project costs were developed (Section 5.6.1) and an economic cost-effectiveness analysis and incremental cost analyses were conducted using IWR Plan software (Section 5.6.2).

5.6.1 Costs

Data for initial construction/implementation, land acquisition, monitoring, and periodically recurring costs for operation, maintenance, repair, replacement, and rehabilitation (OMRR&R), have been developed through engineering design and cost estimation, and real estate appraisal efforts. Details of that data development are explained and discussed later in this report. The main issues requiring economic evaluation attention include equivalent time basis calculations, price levels, and timing of project spending.

Costs represent the difference between conditions without any plan (the "base condition", or "without-project condition") and with a plan or alternative. For purposes of this report and analysis, NED costs (National Economic Development Costs, as defined by Federal and Corps of Engineers policy), are expressed in 2003 price levels, and are based generally on costs estimated to be incurred over a 50 year period of analysis. Costs of a plan represent the value of

goods and services required to implement and operate/maintain the plan. **Table 5-4** displays the costs associated with the alternatives.

The timing of a plan's costs is important. Construction and other initial implementation for component costs cannot simply be added to periodically recurring costs for project operation, maintenance, and monitoring. Also, construction costs incurred in a given year of the project can't simply be added to construction costs incurred in other years if meaningful and direct comparisons of the costs of the different components are to be made. A common practice of equating sums of money across time with their equivalent at an earlier single point in time is the process known as discounting. Through this mathematical process, which involves the use of an interest rate (or discount rate) officially prescribed by federal policy for use in water-resource planning analysis (currently set at 5.375 percent per year), the cost time-stream for alternative plans was mathematically translated into an equivalent, time-basis value.

Engineering Regulation (ER) 1105-2-100 requires that interest during construction (IDC) be computed which represents the opportunity cost of capital incurred during the construction period. Interest was computed for construction and PED costs from the middle of the month in which expenditures were incurred until the first of the month following the estimated construction completion date.

The cost of a project is the investment incurred up to the beginning of the period of analysis. The investment cost at that time is the sum of construction and other initial costs, such as real estate and PED cost plus interest during construction. The real estate costs used were the actual costs paid for each county owned piece of land. **Table 5-4** summarizes the total investment cost and total annual equivalent costs of each alternative plan.

5.6.2 Plan Optimization Using Cost-Effectiveness and Incremental Cost Analyses

Cost-Effectiveness analysis begins with a comparison of the costs and outputs of alternative plans to identify the least-cost plan for every level of output considered. Alternative plans are compared to identify those that would produce greater levels of output at the same cost, or at a lesser cost, as other alternative plans. Alternative plans identified through this comparison are the cost-effective alternative plans. Next, through incremental cost analysis, the cost-effective alternative plans are compared to identify the most economically efficient alternative plans, that is, the best-buy alternative plans that produce the "biggest bang for the buck." Cost-effective plans are compared by examining the additional (incremental) costs for the additional (incremental) amounts of output produced by successively larger cost-effective plans. The plans with the lowest incremental costs per unit of output for successively larger levels of output are

the best-buy plans. The results of these calculations and comparisons of costs and outputs between alternative plans provide a basis for addressing the decision question "Is it worth it?" (i.e., are the additional outputs worth the costs incurred to achieve them?).

TABLE 5-4: COSTS USED IN COST-EFFECTIVENESS FOR OPTIMIZATION

Winsberg Wetland Matrix	Intermediate Hydroperiod	Short Hydroperiod	Long Hydroperiod
Lands	$2,390,500	$2,390,500	$2,390,500
Construction	$6,432,000	$6,254,900	$7,393,500
Total First Cost	$8,822,500	$8,645,400	$9,784,000
IDC Real Estate	$161,677	$161,677	$161,677
IDC Construction	$215,130	$209,207	$247,289
Duration	15 Months	15 Months	15 Months
Total Investment	$9,199,307	$9,016,283	$10,192,966
Annual Equivalent	$533,381	$522,770	$590,994
O&M (yrly)	$140,000	$140,000	$140,000
VegMon (yrly)	$11,370	$11,370	$11,370
Total Annual Cost	$684,751	$674,140	$742,364

Winsberg Farms utilized many performance measures to ascertain how well each of the alternative plans performed on various criteria indicative of ecosystem restoration. Habitat units were derived from each performance measure and selected by the PDT as the metric that best integrated information regarding the quality and quantity of improved hydrologic and ecologic function within the study area.

Sometimes it is difficult to summarize the results of Cost-Effectiveness and Incremental Cost Analyses (CE/ICA) when the analyses are performed separately for distinct performance indicators. This phenomenon often occurs simply because different management measures or alternative plans do different things, provide different types of output, and provide benefits to different biological communities. This is especially true for the Winsberg Farm features and alternatives. Environmental benefits were developed first for the site-specific area using WRAP analysis, and then for the three alternatives using the

Wetland Quality Index (WQI) method. To estimate total benefits from the various alternatives, it is desirable to be able to perform CE/ICA on a metric that combines all performance indices output. This method enabled the use of one total habitat unit score for each alternative.

Cost-effectiveness and incremental cost analyses were conducted for each of the Winsberg Farm alternatives. The analyses compared the alternative plans' average annual costs against appropriate, average annual habitat-unit estimates. The average annual outputs were calculated as the difference between with-plan and without-plan conditions over the period of analysis (through year 2050). Costs used for CE/ICA optimization are displayed in **Table 5-4**. Outputs used for CE/ICA are displayed in **Table 5-8**. The basis for average annual output calculations was previously explained. Note that the output values shown reflect the differences between without-project and with-project on an average annual basis (i.e., ecological "lift" provided by each of the alternatives).

5.6.2.1 Environmental Benefits

The ecological benefits of alternative plans were assessed through two separate analyses. First, existing, future without-project and future with-project conditions were assessed using a modified Wetland Rapid Assessment Procedure (WRAP) (Miller and Gunsalus 1997). Biologists from the U.S. Fish and Wildlife Service (USFWS) and U.S. Army Corps of Engineers (USACE) conducted this assessment to quantify differences in habitat quality between a farm (the existing condition), residential development (the future without-project condition), and a created wetland (future with-project condition). This WRAP analysis was not refined enough to distinguish between differing hydroperiod operations at the wetlands, so an intermediate hydroperiod was utilized to determine base habitat units associated with the creation of a wetlands at the Winsberg site. This second approach, Analyzing Alternative Wetland Designs, was assessed using the Wetland Quality Index (WQI) (Lodge 1997) method. This assessment was conducted by CH2MHILL in partial fulfillment of a contract with USACE (CH2MHILL, 2003), and allowed for discrimination between three proposed wetland designs: Alternative 1) intermediate hydroperiod wetland, Alternative 2) short hydroperiod wetlands in combination, and Alternative 3) long hydroperiod wetlands in combination with deepwater habitat.

5.6.2.1.1 Introduction to Modified Wetland Rapid Assessment Procedure

WRAP is a tool that was originally developed by the South Florida Water Management District (SFWMD) for the regulatory evaluation of wetland mitigation sites. The procedure considers six variables to evaluate how well a wetland is functioning:

1. Wildlife utilization
2. Overstory/shrub canopy of desirable species
3. Vegetative groundcover of desirable species
4. Adjacent upland/wetland buffer
5. Field indicators of wetland hydrology
6. Water quality input and treatment

WRAP is presently utilized by the USACE staff in the Regulatory program in Jacksonville, and is being used to assess benefits and impacts in other CERP projects (e.g., Acme Basin B).

Two WRAP modifications were deemed necessary for this application. First, since the wetlands envisioned here are not in existence, direct field observations could not be used. Instead, the proposed wetlands were evaluated based on assumptions about how they would function after construction, largely guided by observations of the nearby Wakodahatchee Wetland site. Second, since WRAP is designed specifically to evaluate wetland sites, changes were necessary to evaluate the range of upland conditions (agricultural fields and residential development) currently existing on the Winsberg site and predicted for that site in the future without-project condition.

The modified WRAP used for this analysis included the following variables:

1. Wildlife utilization – Plans were evaluated based on their potential to provide breeding, feeding and sheltering areas for native wildlife. As the site under consideration currently provides little native habitat, direct observations of wildlife were not incorporated into the ranking methodology. Rather, the evaluators relied on observations of existing potential habitat within the site, and dispersal corridors from A.R.M. LNWR. Scores were based on a rationale that closely follows the WRAP manual guidelines.
2. Vegetation – Two components of vegetative composition were used to evaluate each site: canopy and groundcover. The scoring scheme is based largely on WRAP, with minor modifications that allow for consideration of upland vegetation. Scores were calculated separately for each vegetative component and then combined as a weighted mean based on the ratio of canopy to groundcover area.
3. Adjacent buffer – The impacts of neighboring land uses on an alternative condition were scored essentially as in WRAP.
4. Impacts to water resources (land use and impervious surfaces). Two attributes contributed to the score for this variable. The Land Use Category follows the WRAP methodology. The Impervious Surface scores were based on the relationship between percent cover of impervious surface and the impacts to water quality (Mesner, 2001). A third

attribute, Consumptive Water Use, was considered as a potential evaluation criterion based on the water demand of different land use types. Preliminary calculations, however, indicated a high degree of variability in water demands for agriculture depending on season and rainfall conditions. This variability reduced the utility of the Consumptive Water Use attribute in differentiating alternative sites.

Each variable was assigned a score ranging from 0 to 3. A score of 3 for any variable indicates that a system is representative of pristine conditions, while a score of 0 indicates that a system has negligible ecological benefits.

5.6.2.1.2 Application

In total, two sites were visited and evaluated using the scoring scheme outlined above: the project site (Winsberg Farm) and a reference site (Wakodahatchee Wetlands). The reference site is a 50-acre wetland located southeast of Winsberg Farm and constructed by Palm Beach County in 1996. This site was evaluated because it serves as a model for the current project.

The reference site was evaluated first. Variables for the existing condition at Wakodahatchee Wetlands were scored based on a September 2003 visit to the site (**Table 5-6**). Future-condition scores, estimated for 50 years after construction of the site, or 2055 for Phase 1 only, were assumed to be generally the same as the existing-condition scores. Two exceptions to this rule did arise: the wildlife utilization and canopy variables are expected to increase in value in the future as wetland vegetation matures.

After establishing scores for Wakodahatchee, existing, future-without and future with-project conditions were evaluated for the Winsberg Farm property. The existing condition for this site was a row-crop vegetable farm, and the future-with-project condition was assumed to be the same as Wakodahatchee's future condition. Based on prevailing land use in the area and the Palm Beach County Comprehensive Plan, future without-project land use was assumed to be residential development.

TABLE 5-5: WRAP EVALUATION SUMMARY

Site	Condition	Assessments											WRAP SCORE
		Wildlife utilization	Vegetation					Buffer	Impacts to H2O resources				
			Canopy	Wt.	Ground cover	Wt.	Wt. Ave.		Land use	Imper. surface	Consum use	Ave.	
Wakodahatchee Wetlands	Existing	2.00	1.50	1	2.00	3	1.88	0.50	3.00	3.00	n/a	3.00	0.61
	Future	2.25	2.00	1	2.00	3	2.00	0.50	3.00	3.00	n/a	3.00	0.65
Winsberg	Existing	0.75	0.00		0.00		0.00	0.75	1.00	2.50	n/a	1.75	0.27
	Future w/o pro.	0.25	0.00		0.00		0.00	0.50	1.00	0.00	n/a	0.50	0.10
	Future with project	2.25	2.00	1	2.00	3	2.00	0.50	3.00	3.00	n/a	3.00	0.65

* WRAP Evaluation Summary For The Wakodahatchee Wetlands and Winsberg Farm

Scores for each variable were added and then divided by the maximum possible score to yield a functional unit score (WRAP score) ranging from 0 to 1 (**Table 5-5**). For the Wakodahatchee site, the WRAP score increases slightly over time as vegetation matures. For the Winsberg site, the created wetland (future with-project condition) score greatly exceeds farm (existing conditions) or residential (future without-project condition) scores. **Table 5-6** uses the acreage associated with the wetland area of Winsberg Farm alternatives and applies to the WRAP score to determine habitat units which are then determined for 10-year increments to demonstrate the implementation growth trend. The future-with increase in habitat units and the future-without decline in habitat units are then utilized to determine an annual HU benefit. A detailed discussion of the WRAP is included in Appendix C. Future increases and decreases in habitat units can be noted in the following figure.

TABLE 5-6: WRAP ANALYSIS AVERAGE ANNUAL HABITAT UNITS

Property	Scale	Habitat Unit (WRAP) Score (ecological quality of project* size)							Annual Benefit
	Acres	Existing	10 years after construc-tion (2020)	20 years. after construc-tion (2030)	30 years after construc-tion (2040)	40 years after construc-tion (2050)	50 years after construc-tion (2060)	Future without project	
Winsberg	120	32.50	73.75	77.50	77.50	77.50	77.50	12.50	49.79

Figure 5-2 below shows the average habitat units using the WRAP analysis for both the "with" and without-project conditions over a 50 year period.

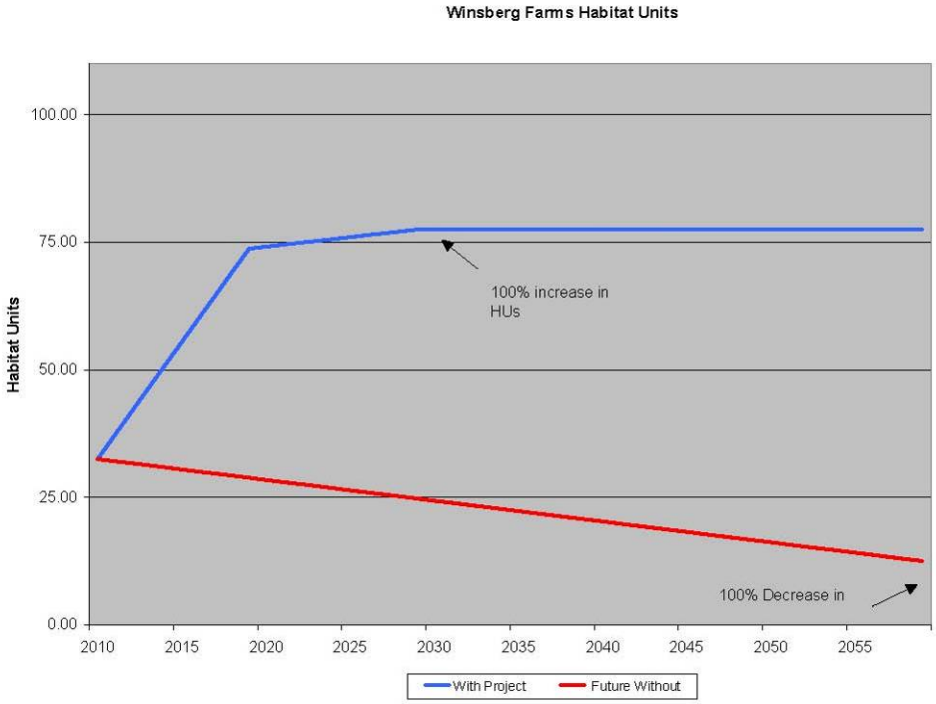

FIGURE 5-2: AVERAGE ANNUAL HABITAT UNITS FOR WINSBERG USING WRAP ANALYSIS

5.6.2.2 Wetland Quality Index Methodology

5.6.2.2.1 Introduction

The WQI method was developed to evaluate wetlands created for mitigation purposes. The methodology uses 17 parameters to assess wetland quality. Three alternative wetland designs were analyzed using this method. Since a Wakodahatchee-like system has already been constructed on the western portion of the project, all three alternatives share that design. Differences are found on the eastern portion of the project, where Alternative 1 has a Wakodahatchee-like system, Alternative 2 has short hydroperiod wetlands, and Alternative 3 has deepwater habitat.

The expected ecological quality of the three, short-listed alternatives was compared using the Wetland Quality Index (WQI), a wetland functional assessment methodology originally designed for Everglades-type habitats (Lodge, 1997). This method was selected for application to this analysis from a variety of wetland functional assessment methods because of its flexibility in allowing attributes of proposed conceptual plans to be compared. Other assessment methods require the analyst to perform an evaluation of the status of an existing wetland, rather than a proposed configuration. For example,

procedures such as the Wetland Rapid Assessment Procedure (WRAP) and Hydrogeomorphic (HGM) procedure are more appropriate for evaluating the success and condition of existing wetlands, including the degree to which water quality improvements are observed, the presence of preferred animal species, establishment of representative hydrology, and habitat productivity. The WQI methodology is appropriate for evaluation of proposed designs because the criteria used include water levels, presence and diversity of wetland plant species, hydroperiod, surrounding environment, and other attributes measurable at the design level. A more detailed discussion of the WQI is included in Appendix C.

In some instances, the WQI included criteria for assessing current conditions. In these cases, alternatives were typically scored equally. Brief descriptions of WQI criteria are as follows:

- Aquatic Prey Base Abundance – The abundance of prey species measured in the field using throw-traps, where the number of fish, crustaceans, mollusks, insects and other species are counted semiannual.
- Aquatic Prey Base Diversity – Total number of qualifying species counted in at least half of the throw-trap samples collected during Aquatic Prey Base Abundance procedure.
- Exotic Pest Plants – Percent cover of exotic species as defined by the Florida Department of Environmental Protection, Chapter 62C-52, Florida Administrative Code.
- Diversity of Macrophytes – Percent cover of vascular plants large enough to be observed without magnification representing more than 5 percent of the total area. For this alternatives analysis, all proposed plant types were included.
- Habitat Diversity within 1,000 feet – Habitats that offer significantly different conditions than the community being evaluated, such as other uplands and shallow, open water, such as sloughs, sawgrass marsh, cypress heads, etc. For the purposes of this evaluation, this criterion was assumed to reflect the total number of habitat types in the east parcel.
- Hydropatter – Water-level status, where conditions include:
  - Inundation greater than one foot for 2.5 months or more (but not exceeding two feet), followed by a seasonal reduction to less than 0.5 foot for a month. This reflects an Everglades-type seasonal habitat, and for the purposes of representing a natural wetland in the region, is a relevant criterion for this evaluation;
  - Depth does not exceed 0.5 foot or is greater than 2.5 feet for any period of the year; and
  - Conditions are between the above two.
- Hydroperiod – Annual period of continuous inundation of at least 0.5 inch, where categories include inundation for five months or longer, but drying

at least once in five years, inundation for three to five months, or greater than five years, or inundation for less than three months;

- Intactness of Wetland Resource – Criteria that include undisturbed, prior disturbance, or prior hydrologic and soil disruption (e.g., farming);
- Peat/Muck Soil Layer – Criteria include average depth more than one foot and covers more than 95 percent of the surface area, average depth six to 12 inches covering more than 95 percent of the surface area, and average depth less than six inches covering less than 95 percent of the surface area;
- Protected Animal Species – Number of protected animal species recorded during monitoring events; assumed equal among these three alternatives in the absence of data;
- Protected Plant Species – Species listed as endangered or threatened in state or federal listings;
- Proximity to Aquatic Refugia – Degree to which wetland habitat is connected to other sources of open water, whereby replenishment of aquatic life to repopulate wetland after dry period or predation is desirable; assumed negligible for all alternatives, as the alternatives are all isolated habitats in a constructed site;
- Sheet Flow – Measure of the uniformity of water flow over wetland surface;
- Surrounding Landscape Condition – Criteria include undisturbed (near-natural), agricultural, rural or lightly urbanized, and highly urbanized;
- Water Quality – Visual inspection of potential indicators of poor water quality, such as excessive algal growth, odors, aquatic faunal indicators, etc. Because of the status of the Winsberg Farm Wetlands Restoration project as a wetland demonstration project receiving secondary effluent, the wetlands are assumed to exhibit similar water quality;
- Wetland Vegetation Cover – Occurrence of obligate wetland species, as defined in the National List of Plant Species that Occur in Wetlands (Chapter 62-340.450(1), FAC); and
- Wildlife Use – Observations of the counts of various bird species (e.g., wading birds, ospreys, anhingas and others), mammals (e.g., round-tailed muskrat) and reptiles (e.g., alligator, Florida softshelled turtle); based on diversity observed at Wakodahatchee, and which was assumed to be equal among the three design alternatives under consideration.

5.6.2.2.2 Application

Results for the WQI analysis are provided in **Table 5-7**. Combined scores for the WQI were 24, 23.5 and 24.5 for Alternatives 1, 2 and 3, respectively. The relatively close scoring by the three alternatives indicates that all would provide significant and comparable wetland habitat, as well as associated ecological

functions. The following list provides explanations and rationale for scores assigned to each alternative:

- Aquatic Prey Base Abundance – Aquatic prey abundance was considered highest for Alternative 3, where inundation is more consistent and occurs at a greater magnitude than Alternatives 1 or 2. These other alternatives were scored equally. Despite the shorter hydroperiod of Alternative 2, it would still be expected to maintain at least low-to-moderate numbers of aquatic prey in deep-water areas.
- Aquatic Prey Base Diversity – The presence of at least seven different species would likely be observed in each alternative, particularly in a vigorous, managed wetland habitat. Thus, each alternative was assigned a score of 1.
- Exotic Pest Plants – As with Wakodahatchee, it is expected that exotic or invasive species would be physically removed by maintenance personnel. Thus, each alternative received a score of 1.
- Diversity of Macrophytes – Macrophytic vegetation coverage was evaluated by calculating the coverage of each habitat type for each alternative. As previously stated, habitat areas with multiple vegetation types were assumed to exhibit equal coverage among species. Scores of 1 were assigned to Alternatives 1 and 3, where no single species covered greater than 50 percent of the area, while a score of 0.5 was assigned to sawgrass-dominated Alternative 2.
- Habitat Diversity within 1,000 feet – By design, Alternatives 1, 2 and 3 all possessed at least two habitat types within 1,000 feet in any direction. Each alternative was therefore assigned a score of 1.
- Hydroperiod – Alternative 2 was assigned a score of 1, as it is short of 0 due to previous agricultural use of the site.
- Peat/Muck Soil Layer – Given that greater accumulation of peat will likely occur in the continuously inundated and more heavily vegetated alternatives, Alternatives 1 and 3 were assigned scores of 1. Alternative 2 was assigned a score of 0.5.
- Protected Animal Species – Number of protected animal species recorded during monitoring events; assumed equal among the three alternatives in the absence of data.
- Protected Plant Species – The potential for serving as habitat for protected plant species, such as bromeliads and orchids, or other endemic South Florida flora, is considered equal among the three design alternatives because of the assumption of exotic- and nuisance-plant maintenance, and the wide diversities of habitats in each. All alternatives were assigned a score of 0.5 for this category.
- Proximity to Aquatic Refugia – All three alternatives include deep, open-water or aquatic slough habitats, which will serve as dry-season refugia for mosquitofish and aquatic wildlife, and were assigned a score of 1.

TABLE 5-7: WQI ANALYSIS PER ALTERNATIVE WETLAND FUNCTIONAL ASSESSMENT

			Rating	Weighting	Alt 1	Alt 2	Alt 3
	Parameter / Function	Abbreviated Rating Criteria (see text)	Points	Factor	Score	Score	Score
		High numbers of potential aquatic prey	1.00				
1	Aquatic Prey Base Abundance	Low to moderate numbers of potential aquatic prey	0.50	1	0.5	0.5	1
		Few to no aquatic prey	0.00				
		7 or more species commonly observed	1.00				
2	Aquatic Prey Base Diversity	3 - 6 species commonly observed	0.50	2	1	1	1
		2 or fewer species commonly observed	0.00				
		<5% cover	1.00				
3	Category I Exotic Pest Plant Species	Between 5% and 35% cover	0.50	2	1	1	1
		>35% cover	0.00				
		No one species has >50% cover	1.00				
4	Diversity of Macrophytes	One species has 51% to 90% cover	0.50	2	1	0.5	1
		One species has >90% cover	0.00				
		2 or more alternative habitats	1.00				
5	Habitat Diversity within 1000 Feet	One alternative habitat	0.50	1	1	1	1
		No alternative habitats	0.00				
		5 months or longer, but drying at least once in 5 years	1.00				
6	Hydroperiod	3 to 5 months, or >5 years continuous inundation	0.50	2	0.5	1	0.5
		Less than 3 months	0.00				
		> 1 ft. for > 2.5 months; < 2 ft. max.; and < 0.5 ft. for > 1 month	1.00				
7	Hydropattern	Between above and below	0.50	4	1	1	1
		Does not exceed 0.5 ft.; or does exceed 2.5 ft.	0.00				
		Undisturbed	1.00				
8	Intactness of Wetland Resource	Prior hydrologic disruption	0.50	1	0	0	0
		Prior hydrologic and soil horizon disruption (e.g., farming)	0.00				
		Average depth > 12" and covers > 95% of surface area	1.00				
9	Peat/Muck Soil Layer	Average depth 6" to 12" and covers at least 95% of surface area	0.50	2	1	0.5	1
		Average depth < 6" and covers < 95% of surface area	0.00				

10	Protected Animal Species Use	Verified or expected frequent use Occasional use but habitat not conducive to sustained presence	1.00 0.50	1	1	1	1
		No use expected	0.00				
		Significant population(s) reported or known present	1.00				
11	Protected Plant Species	Significant population(s) possible due to habitat	0.50	1	0.5	0.5	0.5
		Habitat not conducive to significant population(s)	0.00				
		Open connection to aquatic refugia less than 600'	1.00				
12	Proximity to Aquatic Refugia	Restricted connection to aquatic refugia, or >600' but <2,500'	0.50	3	1	1	1
		Isolated from aquatic refugia, or more than 2,500'	0.00				
		Uniform flow over most of the area observed or expected	1.00				
13	Sheet Flow (during inundation)	Uneven flow due to uneven terrain, berms, ditches, etc.	0.50	1	0.5	1	0.5
		Hydrologically isolated, no net lateral movement	0.00				
		Undisturbed, near natural condition	1.00				
14	Surrounding Landscape Condition	Agricultural, rural, or lightly urbanized	0.50	1	0.5	0.5	0.5
		Highly urbanized	0.00				
		No visual indicators of poor water quality observed	1.00				
15	Water Quality	Visual indicators of poor water quality questionable	0.50	1	1	1	1
		Visual indicators of poor water quality observed	0.00				
		>50% obligate wetland species	1.00				
16	Wetland Vegetation Cover	Between 10% and 50% obligate wetland species	0.50	1	1	1	1
		<10% obligate wetland species	0.00				
		High utilization by native wetland mammals, birds, and reptiles	1.00				
17	Wildlife Use (may be seasonal only)	Moderate utilization by native wetland birds, mammals, or reptiles	0.50	2	1	1	1
		Low utilization by native wetland birds, mammals, or reptiles	0.00				
		Cumulative Score			24	23.5	24.5

*Wetland Quality Index (WQI) Analysis per Alternative Wetland Functional Assessment of Alternatives, Winsberg Farm Wetlands

- Sheet Flow – Due to the presence of deepwater areas and islands, Alternatives 1 and 3 were assigned scores of 0.5. Alternative 2, which is largely sawgrass-dominated, was assigned a score of 1.0, as it most accurately represents a sheet-flow, even-depth distribution of an Everglades-type system.
- Surrounding Landscape Condition – All three design alternatives received scores of 0.5, as the surrounding landscape will ultimately be residential or part of the Winsberg family agricultural reserve, depending upon the use of the Winsberg property not included in the parcels designated for wetland restoration habitat.
- Water Quality – Due to the absence of data, each design alternative received a score of 1. Based on experience at the Wakodahatchee site, it is assumed that nutrient concentrations in the wetland will be reduced by plant and microbial processes that are comparable, regardless of the conceptual design variations under consideration.
- Wetland Vegetation Cover – The design of each alternative as wetland habitat, as well as the nature of the species selected for these designs, indicates that they will be largely dominated by obligate wetland species. Thus, each alternative was assigned a score of 1.
- Wildlife Use – Experience at the Wakodahatchee site and similar habitats in the region suggest that a diverse set of animal species can be expected at the wetland. Alternatives 1 and 3, both fairly diverse habitats, should be expected to contain the full suite of resident wading birds and also be used by migratory species, based upon observations at the Wakodahatchee Wetlands. In spite of the more monotypic habitat in Alternative 2, the presence of deeper and shallower habitats still suggests that animal species will be diverse and abundant. Thus, all three alternatives are assigned a score of 1.

5.6.2.3 Combining the WRAP and WQI Analysis

As mentioned in the previous section, the ecological benefits of alternative plans were assessed through two separate analyses. First, existing, future without-project and future with-project conditions were assessed using a modified Wetland Rapid Assessment Procedure (WRAP) on an intermediate hydroperiod wetland of 114 acres at the Winsberg site. This WRAP analysis was not refined enough to distinguish between differing hydroperiods, so it became important to further refine wetland alternative hydroperiods by using a second ecological model. This second approach involved using the Wetland Quality Index (WQI) method to scale habitat units based on variations from the intermediate hydroperiod. This analysis utilizes the calculation of 49.79 average annual habitat units from the WRAP analysis and equating this with the WQI intermediate hydroperiod score of 24. The next step is to examine the percent

deviation from this WQI score for the long and short hydroperiods, and then adjusting the WRAP habitat unit score accordingly.

There are two different cells (Phase 1 and Phase 2) for each alternative. The first cell represents 72 acres of the total 114-acre wetland creation, and the second cell represents 42 acres. The first cell in all three alternatives will be operated as an intermediate hydroperiod, so the HUs attributed to this area will be the same for all alternatives. The variation will come into account when examining the second cell that contains different hydroperiods for the different alternatives. **Table 5-8** includes the total average annual habitat units for all three alternatives.

TABLE 5-8: COMBINED WQI AND WRAP ANALYSIS

	(Acres)	Alternative 1 Intermediate	Alternative 2 Short Cell	Alternative 3 Long Cell
Cell 1	74	31.12	31.12	31.12
Cell 2 Adjusted for WQI	42	18.67	18.28	19.06
Total Annual Habitat Unit Lift	114	49.79	49.40	50.18

*Acreage does not match the TSP numbers as this analysis was completed before the actual acreage from the surveys was available. The change is the same for all alternatives so the final selection will not change.

5.6.2.4 Cost of Alternatives

The three alternatives located on the Winsberg Property all had the same costs for real estate, monitoring and O&M. The only costs that change for these various plans were for construction. Alternative 3, the long Hydroperiod, had the highest construction cost as it includes the greatest amount of earthwork to establish the predominant pond habitats, and Alternative 2, the short hydroperiod, had the lowest construction cost as it requires the least amount of earthwork.

The following table and figures represent the results of cost effectiveness analysis for the three Winsberg Farms alternatives.

5.7 COST-EFFECTIVE ANALYSIS FOR OPTIMIZATION

Figure 5-3 represents the results of cost-effectiveness analysis for the Winsberg Farm alternative plan. Both the table and figure represent the short, long and intermediate hydroperiods as cost-effective alternatives. All alternative plans are arrayed by increasing costs to clearly show the plans that provide the same output for less cost.

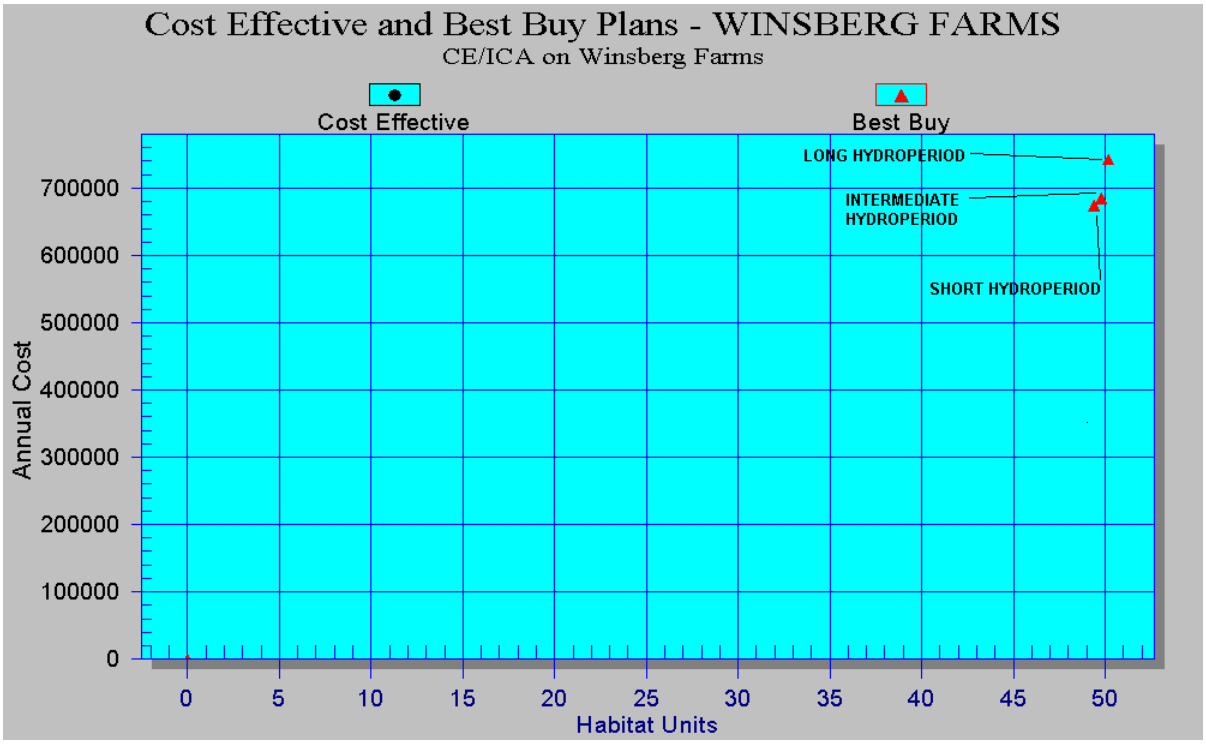

FIGURE 5-3: COST-EFFECTIVE PLANS

5.7.1.1 Incremental Cost Analysis

This section presents the results of incremental-cost analysis for the Winsberg Farm alternative plans for optimization of the site. All cost-effective plans are arrayed by increasing output to clearly show changes in cost (i.e., increments of cost) and changes in output (i.e., increments of output) of each cost-effective alternative plan compared to the without-plan condition. The plan with the lowest incremental costs per unit of output of all plans is the first Best Buy plan. After that plan is identified, all larger, cost-effective plans are compared to the first Best Buy plan in terms of increases in (increments of) cost and increases in (increments of) output. The alternative plan with the lowest incremental cost per unit of output (for all cost-effective plans larger than the first Best Buy plan) is the second Best Buy plan.

Table 5-9 and **Figure 5-4** below show that there are three Best Buy plans -- the short, long and intermediate hydroperiod alternatives.

TABLE 5-9: BEST BUY PLAN

	Average Annual Cost	Output	Average Cost Per Output	Increment Average Annual Cost	Increment Output	Increment Cost Per Output	Best Buy?
Habitat Units (HU)							
Without Plan	$0	0	N/A	N/A	N/A	N/A	
Short Hydroperiod	$674,139	49.40	$13,646	$674,139	49.40	$13,646	Best Buy
Intermediate Hydroperiod	$684,751	49.79	$13,752	$10,612	.39	$27,210	Best Buy
Long Hydroperiod	$742,364	50.18	$14,794	$57,613	.39	$147,725	Best Buy

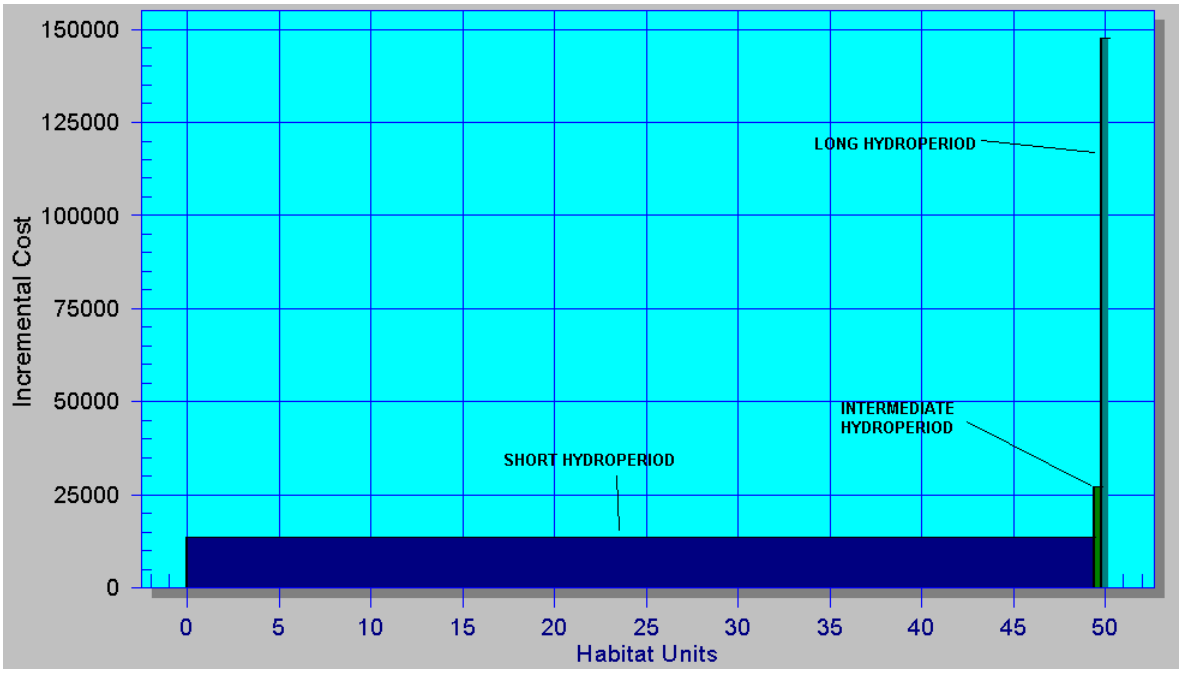

FIGURE 5-4: BEST BUY ALTERNATIVE PLANS

5.7.1.2 Next Added Increment and System Wide Analysis

Because the Winsberg Farm project is not hydraulically connected to the CERP hydraulic system, and it has little impact outside of the project footprint, this incremental analysis is essentially the next added increment. Also, because the project is hydrologically distinct, it is not necessary to conduct a CERP system-wide analysis.

5.7.1.3 Tentatively Selected Plan

Every hydroperiod design for the Winsberg Farm site is a cost-effective and best-buy plan. It is estimated by CH2MHill that the intermediate hydroperiod design provides more water to the natural environment through infiltration than the short hydroperiod design and an amount similar to the long hydroperiod design. Due to increased water usage and the fact that the intermediate hydroperiod costs less than 2 percent more than the short hydroperiod while providing more ecological benefits, the intermediate hydroperiod was selected as a better investment than the short hydroperiod. The long hydroperiod provides similar water to the natural environment but costs almost 10 percent more than the intermediate hydroperiod. As is noted in **Figure 5-4**, there is a relative large increase in incremental costs between the intermediate and long hydroperiod. The intermediate hydroperiod was determined to be the plan that most effectively and efficiently accomplishes the objectives of the project.

5.7.2 Planning Criteria

USACE policy (ER 1105-2-100) requires the use of four criteria in the screening and evaluation of alternative plans. The criteria are acceptability, completeness, effectiveness and efficiency. These criteria are defined in the following paragraphs:

Acceptability is the workability and viability of the alternative plan with respect to acceptance by state and local entities and the public, and compatibility with existing laws, regulations and public policies. One aspect of acceptability is whether the alternative is feasible or doable with regard to technical, environmental, economic, social or similar reasons.

Completeness is the extent to which an alternative plan includes and accounts for all necessary investments or other actions to ensure the realization of the planned effects.

Effectiveness is the extent to which an alternative plan contributes to the attainment of planning objectives (alleviates problems and achieves opportunities). The most effective alternatives make significant contributions to all planning objectives. Less-effective alternatives make smaller contributions to one or more of the planning objectives. Effectiveness is a matter of degree, rather than all or nothing.

Efficiency is the extent to which an alternative plan is the most cost-effective means of alleviating problems and realizing opportunities, consistent with protecting the nation's environment, and is thus a primary measure of resource

allocation. Cost-effectiveness is obviously a common measure of efficiency but with non-monetary and opportunity costs considered, as well.

TABLE 5-10: RELATIONSHIP OF ALTERNATIVES TO PLANNING CRITERIA

Criteria	No Action	Alternative 1 Intermediate Hydroperiod	Alternative 2 Short Hydroperiod	Alternative 3 Long Hydroperiod
Acceptability	Not acceptable	Fully Acceptable	Fully Acceptable	Fully Acceptable
Completeness	Not complete.	Complete	Complete	Complete
Effectiveness	Not effective. Does not address objectives or provide ecosystem benefits.	Produces optimum habitat units.	"Saves" smallest amount of water from deep well injection	"Saves" largest amount water from deep well injection.
Efficiency	Not efficient. Provides no benefit	It optimizes the benefits that can be obtained on the Winsberg site. It is the Best Buy Plan	Is cost effective	Cost most to construct. Not cost effective

5.7.3 Risk and Uncertainty

5.7.3.1 Sequencing and Adaptive Assessment

The CERP consists of 68 major components and six pilot projects. Significant uncertainty associated with the individual components of the plan was recognized during the Comprehensive Review Study. There are a large number of potential combinations of these components that may result from differences in design and operational schedules developed through the PIR process. Even as planning efforts for the separate projects evolve, there are also changes in budgets, policies, resource demands, and operational principles. As such, a fundamental implementation principle for the CERP is to utilize adaptive assessment and management to continually refine and improve plan performance. Incremental revisions throughout the CERP planning process will lead to improved performance through optimal project design and operation. The order and schedule for project implementation will also be optimized to achieve desired ecological responses. Utilization of the adaptive assessment policy minimizes the effects of uncertainty with respect to the effects of CERP projects on the natural system and other water-related needs of the region related to the design and implementation of the CERP.

Since the Winsberg Farm project is not hydraulically connected to the regional water management system, sequencing, dependency on other projects, and uncertainty with respect to system-wide ecosystem response should not play a

significant role in achieving project benefits. Principles of adaptive management will still be applied to project through monitoring and periodic assessment activities, and modification of project operations if appropriate to ensure that project benefits continue to be achieved.

5.7.3.2 Analysis of Project-Specific Effects

This project is based on the best available scientific and engineering information. While no adverse impacts are expected, a low probability of risk is always present, particularly with respect to vegetative response and fish and wildlife utilization in a created wetland. The project design is not unique; thus, it should not create unique risks.

5.7.3.3 Project Effects on Groundwater

Because the volume of water added to existing groundwater is small (no more than 5 MGD), the increase in groundwater levels and degradation of groundwater quality is not expected.

5.7.3.4 Project Features

The Winsberg Farm Wetlands Restoration Project will consist of constructed wetlands that will include the following standard water resources project features:

- Pump Stations
- Culverts
- Weirs
- Embankment
- Revetments
- Spillways

5.7.3.5 Project Schedule and Costs

Since Phase 1 is already constructed and operational, it is not anticipated that any new tasks will be required for Phase 2 that would increase overall project delivery dates and create significant risk with respect to cost. As such, no negative impacts to project schedules are anticipated.

5.7.3.6 Land Availability and Acquisition Issues

All lands necessary for the construction, operation and maintenance of the selected alternative plan have been acquired by the non-federal sponsor, Palm

Beach County. As such, there is minimal uncertainty associated with land availability and acquisition.

5.7.4 Conclusions

Alternative 1, the intermediate hydroperiod wetland created at the Winsberg Farm site, is the Tentatively Selected Plan (or Selected Alternative Plan in accordance with NEPA). Since a portion of the project has already been constructed and all of the project lands have been acquired by the non-federal sponsor, actual real estate costs were used in the preparation of project cost estimates. Alternative 1 is cost-effective and a best-buy, based on cost effectiveness and incremental cost analysis performed using IWR software.

Alternative 1 is also the National Ecosystem Restoration (NER) Plan because it optimizes incremental environmental outputs and costs. Alternative 3 (long hydroperiod wetland) produces slightly more output, but at much higher cost.

Alternative 1 is within WRDA 2000's programmatic authority limit of $25 million for CERP project approval for implementation by the Secretary of the Army.

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SECTION 6
*THE SELECTED PLAN

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6.0 THE SELECTED PLAN

6.1 DESCRIPTION OF PLAN COMPONENTS

6.1.1 Tentatively Selected Plan

Alternative 1 is the Tentatively Selected Plan (TSP). The wetland restoration project would be located on about 175 acres of farmland just east of the Southern Region Water Reclamation Facility (SRWRF). About 114 acres of the site would be hydrated using treated wastewater from the SRWRF. The remaining area includes upland habitat, parking, and recreation features and access. Thus, the proposed concept would result in creation of a wetland/upland mosaic system about three times the size of the Wakodahatchee Wetlands, and its location adjacent to the Wakodahatchee site would leverage those recently created ecosystem restoration benefits by expanding the constructed wetland into an integrated system having even greater regional significance.

Phase 1 is about 72 acres of wetland and upland habitat. Included in Phase 1 is about 13.2 acres that include an interpretive center, boardwalks, parking lot, and maintenance building. Phase 1 construction of wetland and upland habitat has been completed by the sponsor, and the facility is now in operation. Phase 2 will be an additional 42 acres of wetland and upland habitat located to the east of Phase 1.

The TSP is configured assuming regulated inflow of water to maintain continuous inundation. Water levels will be allowed to fluctuate seasonally within a six-inch to two-foot range throughout the entire 114 acres in response to natural, seasonal variations in rainfall. These variations in depth and duration of flooding (i.e., hydroperiod) will influence the growth and distribution of plant species within the wetland. More than 673,000 plants will be planted as part of this wetlands creation project, including more than 48,000 plants in the deep zones, 619,000 plants in the marsh or littoral zones, and almost 5,000 plants in the transition or upland zones. Details of the plant species, including mixing, spacing and numbering, are in the Monitoring Plan in **Annex E**, **Table E-4**.

Inflow from SRWRF enters the western half of the project (Phase 1). The western half of the project is divided by an internal levee, which creates a Cell 1 to the north and a Cell 2 to the south. Water levels in each cell can be independently managed by operation of inflow gate valves and butterfly valves and outflow adjustable weir control structures. Each cell has a gated control structure with a 24-inch RCP culvert, that connects flow at the weir structures to a 15 horsepower (HP) recirculation pump for moving water within phase 1, and a 250-HP pump for sending excess water back to the SRWRF for deep well injection, if necessary. Similar to Phase 1, Phase 2 of the project will be divided by an internal embankment creating Cell 3 to the north and Cell 4 to the south.

There is a 15-HP pump located in the southeast corner of Phase 2 that re-circulates flow in Cells 3 and 4. Project features and layout are displayed in **Figure 6-1**.

The adjustable weir control structures in Phase 1 can be operated to:

- Allow flow to the eastern half of the project (Phase 2); flow water between the control structures to maintain flow to Cells 3 and 4 during periods of maintenance for Cells 1 and 2, or if one of the control structures is down for maintenance; or
- Circulate flow in the western half of the project by a 15-HP recirculation pump; or
- Send flow to deep-well injection by a 250-HP discharge pump in the event pool elevations rise beyond a set point due to direct rainfall.

Table 6-1 includes design elevations taken from Phase 1 construction plans. Phase 2 of the project will be constructed to the same elevations as Phase 1.

TABLE 6-1: WINSBERG DESIGN ELEVATIONS

	Elevation (feet – NGVD 29)
External Berms	26.5 or greater
Walkway Deck	23.0-24.0
Internal Berms	23.0
Normal Operating Water Level	19.5-21
Existing Ground	19.0-20.5
Shallow Marsh Area	19.5-20.0
Deep Marsh Area	16.0-19.5
LWDD Canals -- Normal	16.0
Deep Zones -- Bottom	15.0

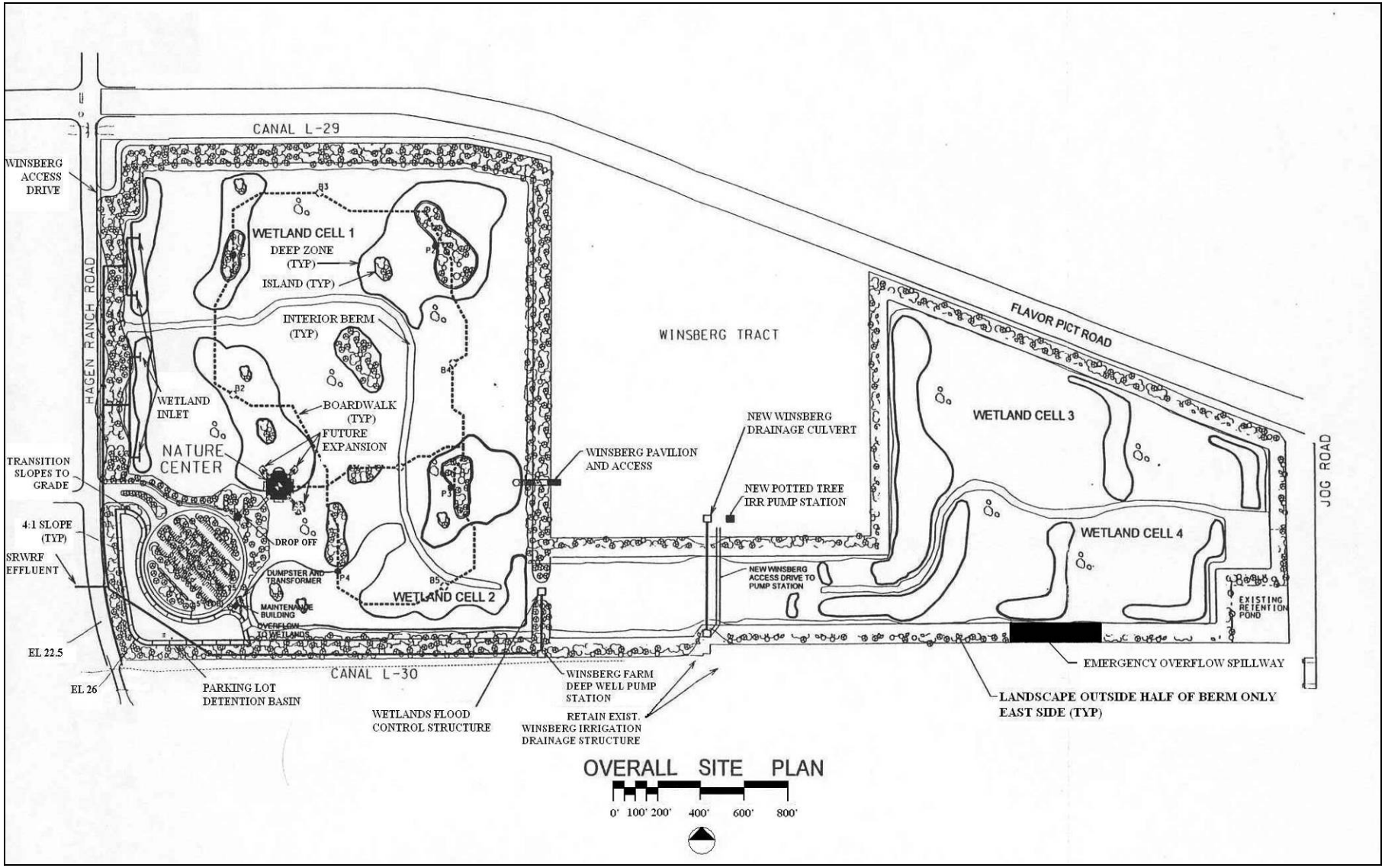

FIGURE 6-1: CONCEPTUAL DESIGN OF TSP

6.1.1.1 Construction Features

6.1.1.1.1 Embankment

An embankment that is 7.5 feet high with 3:1 side slopes and a 10-foot top-width will surround all of Phase 2. The berm's alignment was selected to maximize the wetland area, while taking into account the needs of local sponsors. It was necessary to alter the embankment alignment from the original plan to account for a stormwater retention pond that will be constructed on the eastern edge of Phase 2. It was also necessary to move the northwest corner, levee alignment along the proposed Flavor Pict Road. This realignment allows for a proposed fire and rescue station. The initial levee design was obtained from the local sponsor, who contracted the design to Hazen and Sawyer. This design was evaluated for stability by the U.S. Army Corps of Engineers (USACE), and this analysis can be found in the engineering appendix, **Appendix A**, Section A-14.

6.1.1.1.2 Water Control Structures

Initial inflows into the wetlands for both phases are delivered from the wastewater treatment facility through diffusers into Cells 1 and 2 in Phase 1. This flow is measured by an electromagnetic flow meter located on the Phase 1 secondary monitoring and control structure. Currently, the flow control structure regulates inflows to 3 MGD, which is the permitted volume for Phase 1. Upon completion of Phase 2, the flow control structure will regulate inflows up to 5 MGD, the anticipated design flow for the complete system. No structural modifications are required for this flow increase, as the increase was already accounted for during the initial design.

Phase 2 of the project uses two, 24-inch RCP-culvert flow-control structures with actuated mechanical weirs on the western project boundary to route water into Phase 2. These structures were completed with stub-outs for future connections to Phase 2 when Phase 1 was constructed. Two, 24-inch pipes will be connected to the structures during construction of Phase 2 to complete the structures and allow controlled flows into Cells 3 and 4. Operation of the structures will be controlled remotely from the SRWRF, with the option of on-site operations.

A 15-HP pump will be located in the southeast corner of the project to a line running to the head of Phase 2 to re-circulate water in the wetlands and prevent stagnation. Discharge from the pump will be through two diffusers at the head of the system. There is no flow requirement this pump needs to meet; it is used only to provide a minimal flow in the system to ensure there is no standing water in the wetlands when no inflows are present. It will be similar to the pump used in Phase 1 of the project, and the specifications are provided in the Mechanical portion of the engineering appendix (**Appendix A**).

6.1.1.1.3 Culverts

There are two, 24-inch RCP-actuated culverts that connect Phase 1 with Phase 2. These culverts were designed and already constructed in the completed section of the project. Based on design inflows to the system, and that the second phase will add 2 MGD, this works out to 1.5 cfs per culvert under normal operating conditions. No additional analysis was required as these structures are more then adequate to handle the design flow rate.

6.1.1.1.4 Spillway Structures

A. Spillway 1 - The first spillway separates Phase 1 from Phase 2. This passive structure will be constructed by lowering the existing embankment to 22 feet National Geodetic Vertical Datum 1929 (NGVD 29) and then reinforcing the flow section with articulated concrete mats or another form of permeable armoring. This structure provides a large volume passive hydraulic connection between Phase 1 and Phase 2 allowing the equalization of water to pass between the two phases during large storm events, allowing peak flows to discharge over the emergency overflow spillway, if required.

B. Emergency Overflow Spillway - The emergency overflow spillway is 450 feet wide and will be located on the southern boundary of Phase 2 with a discharge outlet to the C-30 canal under control of the Lake Worth Drainage District (LWDD). The first level of the spillway is 200 feet long and has an elevation of 22.5 feet NGVD 29 and the second level is 250 feet long at an elevation of 23.0 feet. This wetland design contains all storm events less than the 100-year event within the wetlands system, and a peak discharge from the spillway during the Probable Maximum Precipitation (PMP) of 1240 cfs. The design of the spillway is an articulated concrete reinforced mattress that is installed into the embankment from the operational pool level on the wetland side, up and over the spillway crest and down to the toe of the embankment. At the toe of the embankment, there will be a 12 foot wide concrete pad with a 0.5 foot endsill to control the hydraulic jump. Water will then pass down an articulated concrete mat reinforced section towards the C-30 canal.

   The emergency overflow spillway is a design compromise that is required to meet all regulatory and design requirements of the Palm Beach County Water Utility District, the LWDD, the Florida Department of Environmental Protection (FDEP), and Federal dam safety requirements. This system is designed to contain the entire 100-year storm event with no discharges over the emergency overflow spillway. A detailed discussion

of this compromise is contained in Section A.10.2.1 b of the Engineering **Appendix A**.

6.1.1.1.5 Recirculating Pump Station

The Winsberg Farm recirculating pump station will feature the following:

- Lift-type pump station with one wet well
- One 1.55 cfs, vertical, submerged, electric pump
- Pump well-water-level detection
- Automatic backwashing strainer system

a) Pump Station. The pumping equipment and station shall be similar to that shown on Plate M-1 (all plates can be found in Engineering **Appendix A**). All NGVD 29 elevations shall be exactly the same as shown.

The pump station is constructed below ground, as shown, with walls extending above 25 feet NGVD 29 so the water surface elevation in the pump station is nominally the same as the water surface elevation in the Phase 2 wetland. The pump station includes a wet well with an automatic backwashing strainer system and an influent baffle structure to prevent most floatable materials that may pass from the strainer and settle from reaching the pump. The electric weir-gate structure location is shown on Plate G-2, and details are shown on Plates S-1 and S-2.

The pump shall be a vertical, submerged, electric pump rated to deliver recirculating flows at 1.55 cfs at 15 feet of total dynamic head, at no less than 50 percent efficiency. The maximum pumping water level on the discharge side will be about 25.5 feet NGVD 29. The minimum water level in the intake well sump shall be 15.5 NGVD 29.

The pump shall move water down to a low of 15.5 feet NGVD 29 in the pump-well sump at a discharge-side, high-water level of 25.5 feet NGVD 29. At 15.5 feet NGVD 29 in the intake well sump, the pump shall cut off. The pump shall also cut off at a water level of 25.5 feet NGVD 29 in the pump well. The pump shall be capable of constant speed operation through the range of static heads, a maximum of 10.5 feet, and head losses due to minor and friction losses from the associated valves, fittings and discharge pipe.

b) Valves and Flow Meter. The discharge pipe shall be outfitted with a check valve and a gate valve as shown on Plate M-1.

c) Discharge Pipe. The pump shall discharge water through about 3,200 feet ductile iron pipe (DIP) as shown on Plate M-1 and Plates G-2 and G-3. The final velocity at the discharge end shall be no greater than 1 ft/s. The pump discharge pipe will terminate into a diffuser as shown on Plates G-2 and G-3.

d) Automatic Backwashing Strainer System. The trash strainer system will be an automatic backwashing strainer system, similar to the one used in Phase 1 and shown on Plate M-1. The strainer system selected must show a satisfactory history of operation at previously completed pump stations.

e) Pump Bay Water-Level Detection. A float/switch type, water-level detection device in each pump bay will be necessary for detecting pump shut-off low- and high-water levels.

Inflow from the SRWRF effluent enters the western half of the project (Phase 1). The western half of the project is divided by an internal levee, which creates a Cell 1 to the north and a Cell 2 to the south. Cell water levels can be independently managed by operation of inflow gate and butterfly valves, as well as control structure outflows. Each cell has a gated control structure with a 24-inch RCP culvert.

The control structure can be operated to:

- Allow flow to the eastern half of the project (Phase 2), and
- Circulate flow in the western half of the project by a 15-HP recirculation pump
- Send flow to deep-well injection by a 250-HP discharge pump in the event pool elevations rise beyond a set point due to direct rainfall.

The recreation feature will consist of an 8,600-square-foot visitor center, 6,300 linear feet of boardwalk out over the wetland with four small, covered overlooks, and a 125-car, 10-bus, parking lot. The boardwalk is the equivalent of an elevated nature trail through the wetland

6.1.1.2 Project Features

The Winsberg Farm Wetlands Restoration Project will consist of constructed wetlands that will include the following project features:

- Pump Stations
- Culverts
- Weirs

- Embankment
- Revetments
- Spillways

The risk and uncertainty associated with the construction and operation of these features of the proposed project is minimal. All features have been designed and constructed through established and applied technology. No experimental design was necessary for any component of the proposed impoundment. Additionally, USACE and the Palm Beach County Water Utility Department (PBCWUD) have extensive and reputable credibility in the design, construction, and operation and maintenance of the proposed features from previous, water-resource planning efforts.

6.2 COST ESTIMATE

6.2.1 Initial Costs

The total estimated initial cost of the recommended plan is $16,868,256 at October 2005 price levels. This estimate is the baseline estimate and, in accordance with federal water-resource planning regulations, does not include future price escalation. The estimated initial cost for the recommended plan is shown in **Table 6-2**. Costs shown are for the entire Winsberg Farm Wetlands Restoration project (Phase 1 and 2).

TABLE 6-2: ESTIMATED INITIAL COSTS

Feature	Cost *	Totals
Utilities and Relocation	90,502	
Planting	385,279	
Levees	5,332,116	
Pump Stations	1,087,372	
Spillway	1,908,000	
Culverts	58,838	
Recreation Features[1]	4,508,149	
Subtotal		13,370,256
Detailed Design	$475,000	
Construction Management	$375,000	
Subtotal		850,000
Construction Total		$14,220,256
Lands	$2,648,000	
Total		$16,868,256

(*Phase 1 used 2005 price levels)

[1] Recreation cost-sharing will be limited to 10 percent of the total federal cost.

6.2.2 Construction Cost-Estimate Contingencies

A construction contingency cost of 25 percent of construction cost was utilized. No statistical analysis of cost risk was performed. Normal design variances are expected and normal contingency values were used. The risk of cost overruns is considered to be low, since Phase 1 is already constructed and costs are known.

6.3 SELECTED PLAN COSTS

6.3.1 Investment Costs

Department of the Army Engineering Regulation (ER) 1105-2-100 requires that interest during construction (IDC) be computed which represents the opportunity cost of capital incurred during the construction period. Interest was computed for construction and PED costs from the middle of the month in which expenditures were incurred until the first of the month following the estimated construction completion date. The interest rate used for the recommend plan is 5 1/8 percent. Interest during construction was computed for real estate and construction costs, and was computed for the total real estate cost starting from the month prior to construction commencing.

It should be noted that the annual costs depicted in **Table 6-3** do not equal the costs used in the alternative evaluation, Section 5.6. The costs used in Section 5.6 are Rough Order of Magnitude Costs (ROM), while the cost estimates for the recommended plan are detailed design costs, whereas the costs presented in Section 5.6 utilized a 5 3/8 percent interest rate.

TABLE 6-3: INVESTMENT COSTS

Cost Component	Alternative 1 Intermediate Hydroperiod
Lands	$2,648,000
Construction	$12,033,137*
Total First Cost	$14,681,137
IDC Real Estate	$170,711
IDC Construction	$383,827
Duration	15 Months
Total Investment	$15,235,675
Annual Equivalent	$850,731
OMRR&R (yearly)	$140,000
Veg Monitoring (yearly)	$11,370
Total Annual Cost	$1,002,100

*Used 2005 price levels for both phases

6.3.2 Operation, Maintenance, Repair, Replacement and Rehabilitation Costs

Annual operation and maintenance costs were estimated for the construction features of the recommended plan. The operation and maintenance costs were determined by extrapolation from operational costs by using industry-standard cost data and by using data from past and projected future-cost trends. The average, annual operation, maintenance, repair, replacement and rehabilitation (OMRR&R) costs are estimated to be $140,000.

6.3.3 Monitoring Cost

The current average annual cost estimate for monitoring and adaptive assessment activities is $11,370. Much of the monitoring is front-loaded, with the most intensive monitoring scheduled for the early years of the project when the most rapid ecosystem change is expected to occur.

6.3.4 Annual Costs

Investment costs were converted to annual costs using an interest rate of 5 1/8 percent and a period of analysis of 50 years to compute interest and amortization. Annual operation and maintenance costs, and monitoring and

adaptive-assessment costs, were then added to interest and amortization costs to determine the average annual cost, which is $1,002,100 for the recommended plan (**Table 6-3**).

6.3.5 Cost-Estimate Uncertainties

The current, estimated cost of the recommended plan is based on the best available information, and utilizes information developed during the construction of Phase 1 features. Appropriate contingency factors were used in developing the cost estimates to reflect the uncertainties inherent at this stage of project development. As more site-specific analysis is completed for the remainder of the project, the contingency factors will be revised to reflect the greater levels of certainty.

6.4 DESIGN AND CONSTRUCTION CONSIDERATIONS

Phase 1 of the project has been constructed and has received a domestic wastewater facility permit in accordance with Chapter 403 FAC.

The completion of Phase 2, consisting of discharging secondary effluent into a 42-acre constructed treatment wetlands requires a domestic wastewater facility permit in accordance to Chapter 403 FAC. The existing permit will be modified to include Phase 2. A pre-application meeting is to be held as soon as the conceptual design has been completed. As part of the project description the following parameters are required:

- Pretreatment components
- Treatment Components
- Residual Handling Components
- Effluent Disposal Components
- Winsberg Farms, Phase 2 Details:
  - Monthly average flow
  - Proposed infiltration /wetlands acreage
  - Number of cells proposed.
  - Project site location
  - Any additional information describing the wetlands management and their function

6.5 LERRD CONSIDERATIONS

Section 601 of the Water Resources Development Act (WRDA) of 2000 and USACE policy require that Land, Easements, Right-of-way, Relocation, and Disposal Areas (LERRD) will be provided by the non-federal sponsor.

The total first-cost of the project, including the value of LERRD and pre-construction engineering and design costs, will be shared equally between the federal government and non-federal sponsor. The non-federal sponsor will provide cash or manage a portion of construction as necessary to meet its 50 percent share of the total first-cost of the project to be balanced according to Section 601 of WRDA 2000 to maintain a 50/50 cost share every five years.

6.6 OPERATIONS AND MAINTENANCE CONSIDERATIONS

The Operations Manual is contained in **Annex D**. It contains detailed discussion of the operation and maintenance considerations for the Winsberg Farm project. The following are the main O & M issues.

6.6.1 Major Constraints

A. Wetland water depth. Water levels will be allowed to fluctuate seasonally within a one- to two-foot range throughout Phase 1 Wetland and Phase 2 Wetland in response to natural, seasonal variations in rainfall. These variations in the depth and duration of water elevations will influence the growth and distribution of plant species within the wetland. The wetland water levels will be maintained at an optimum water level between 19.5 ft and 19.75 ft for sufficient vegetation growth; with normal pool elevation not to exceed 20.0 ft. Significant fluctuations in pool elevation could result in a loss of vegetation which would require replanting.

B. Pretreatment System. Minimum treatment standards must be followed per Florida statutes. The wetland health and performance will depend heavily on avoiding excessive constituent loads. Maintaining normal and consistent operating conditions in the reclaimed treatment process will maintain a high level of treatment wetland performance.

C. Wetland-Cell Maintenance. Routine maintenance will consist of spraying for invasive plant species; non-typical operations are not required for this routine maintenance. Flow to the cell will be reduced to allow for other maintenance activities when necessary. The lift station, the Cell No. 1 and Cell No. 2 Flow Control Structures, and RTUs shall be physically inspected monthly. All manually operated valves shall be exercised at least once every 4 months.

D. Availability of Water. Water entering the Phase 2 Wetland must first pass through the Phase 1 Wetland. During a drought if sufficient water is not available to enter into the Phase 2 Wetland it is understood a loss of vegetation could occur. No alternate water source is identified.

6.7 PRE-STORM/STORM OPERATIONS

The inflow to the wetland will be from the SRWRF and rainfall. In the event the wetlands exceed the maximum operating pool elevation of 21.0 ft due to direct rainfall, excess water will be delivered to deep well injection via RTU #2. Only under extreme conditions (greater than the 100-year storm event) will the spillway be overtopped and water would enter the L-30 canal. As required in the Florida Department of Environmental Protection permit issued for the Phase 1 features, emergency notification to the surrounding areas will occur when the elevation of the wetland exceeds 23 feet. The PBCWUD will follow the Palm Beach County emergency operations procedures.

6.8 FLOOD EMERGENCY ACTION PLAN

The Flood Emergency Action Plan will be completed for the Winsberg Farm Wetland Restoration Project prior to construction completion. The Flood Emergency Action Plan to be developed should be consulted for related emergency preparation and action. Local emergency management offices will be provided copies of the Flood Emergency Action Plan, as necessary. This plan may be used to supplement Hurricane or Tropical Storm Regulations. As outlined in Engineering Regulation 1130-2-530, the Flood Emergency Action Plan shall include the following:

- A written Emergency Notification Procedure for serious abnormal conditions to provide for safety of people in the vicinity of the storage area and also trigger immediate response for remedial assistance to the levee/water control structure.
- A description or list of conditions leading to emergency situations and ways of dealing with them should they occur.
- Listing of location, types, and quantity of emergency repair materials and equipment.
- Details outlining responsibilities for inspection and execution of emergency repairs.
- List of contractors available within a reasonable distance of the project area.
- As required in the Florida Department of Environmental Protection permit (Permit Number FLA041424), emergency notification to the surrounding areas will occur when the elevation of the wetland exceeds 23 ft. For more detailed discussion, see **Annex D**.

6.9 CONTRIBUTION TO ACHIEVE INTERIM GOALS AND TARGETS

6.9.1 Alternative Plan Contributions

Section 601(h)(3)(C)(III) of WRDA 2000 (P.L. 106-541) required the CERP Programmatic Regulations to include the "establishment of interim goals to provide a means by which the restoration success of the Plan may be evaluated throughout the implementation process." Section 385.38 of the CERP Programmatic Regulations (33 CFR, Part 385) further describes the intent and underlying principles for establishing interim goals and a process for developing them. Section 385.39 of the CERP Programmatic Regulations contains the requirement to develop interim targets to measure progress toward meeting the other water-related needs of the South Florida region, and describes the intent, underlying principles, and process for establishing the interim targets.

Consistent with the processes for developing interim goals and targets required in the CERP Programmatic Regulations, Restoration Coordination and Verification (RECOVER) issued a final report containing recommendations for interim goals and targets on February 17, 2005. Interim goals and corresponding indicators for evaluating progress toward the restoration of the South Florida ecosystem are recommended for the northern estuaries, Lake Okeechobee, Everglades, and southern estuary regions. Interim targets and corresponding indicators for water-supply and flood-protection functions throughout South Florida are also recommended. **Table 6-4** displays the Everglades Interim Goal Indicators. Only those indicators that are applicable to this project were evaluated for the alternative plans.

TABLE 6-4: EVERGLADES INTERIM GOAL INDICATORS

No.	Indicator
3.1	Water Volume
3.4	System-Wide Spatial Extent of Habitat
3.6	Periphyton Mat Cover, Structure and Composition
3.10	American Alligator
3.11	System-Wide Wading Bird Nesting Patterns

Similarly, interim target indicators (**Table 6-5**) have been established for various water supply, resource protection and flood protection functions throughout South Florida. Only those indicators that are applicable to this project were evaluated for the alternative plans.

TABLE 6-5: INTERIM TARGET INDICATORS

No.	Indicator
1.1	Water Volume
1.2	Water Supply to Lower East Coast Service Area

Each plan, including the No-Action alternative, was evaluated qualitatively in terms of contributions toward interim goals and targets established for the CERP. The No-Action alternative provides no contribution toward the interim goals and targets compared to current conditions. Since the project is essentially hydrologically isolated from the regional water management system, and due to the relatively small difference in the effects of each alternative plan, each alternative plan contributes equally toward achieving applicable interim goals and targets. **Table 6-6** summarizes each plan's contributions toward the interim goal and interim target indicators.

Because the Winsberg Farm Wetlands Restoration Project is not expected to affect hydrologic conditions outside of the project footprint, it is not expected that the project will have any impact in the northern estuaries, Lake Okeechobee, and southern estuary regions.

TABLE 6-6: CONTRIBUTIONS TOWARDS INTERIM GOALS AND INTERIM TARGET INDICATORS

Everglades Interim Goal Indicator	No Action	Alt 1 Winsberg Intermediate Hydroperiod	Alt. 2 Winsberg Short Hydroperiod	Alt. 3 Winsberg Long Hydroperiod
3.1 Water Volume	No Increase	114 acres increase in reservoir storage volume	Same	Same
3.4 Spatial Extent of Habitat	No Change	114 acres increase in spatial extent	Same	Same
3.6 Periphyton	Continued decline in desirable species composition	Improvement in species composition associated with hydropattern and P discharge improvements	Same	Same
3.9 Aquatic Fauna Populations	No Change	Improvements in aquatic fauna forage and nesting habitat in WCA 3 associated with hydropattern improvements	Same	Same
3.1 American Alligator	No Change	Improvements in alligator forage and nesting habitat associated with increase in forage	Same	Same
	No Change	Improvements in wading bird nesting expected associated with increase in habitat	Same	Same
Interim Target Indicators				
1.1 Water Volume	No Change	114 acres increase in reservoir storage volume	Same	Same
1.2 Lower East Coast Water Supply	No increase in supply, increase in demand	Increase in volume of water available to maintain canal stages for aquifer recharge due to additional storage volume	Same	Same

6.10 ECONOMIC, ENVIRONMENTAL AND OTHER SOCIAL FFECTS

A system of accounts was established for water resources projects and is codified in USACE planning regulations and policies. The system of accounts is useful for plan comparison, and helps to inform decision-makers. **Table 6-7** displays the results for the No Action alternative and Alternatives 1-3.

TABLE 6-7: SYSTEM OF ACCOUNTS

IMPACT ASSESSMENT	No Action Alternative	Alternative 1 Winsberg Intermediate Hydroperiod	Alternative 2 Winsberg Short Hydroperiod	Alternative 3 Winsberg Long Hydroperiod
1. National Economic Development Effects (NED)				
Estimated Construction Cost[1]	$0	$6,432,000	$6,254,900	$7,393,500
Total habitat created (Ac)	$0	114	114	114
Cost per acres created ($/Ac)	$0	$56,421	$54,867	$64,855
Average Annual Cost	$0	$684,751	$674,139	$742,364
2. National Ecosystem Restoration (NER) Effects				
Annual Habitat Unit Lift	$0	49.79	49.40	50.18
Cost per annual habitat unit	$0	$13,752	$13,646	$14,794
Volume of Wastewater reused	$0	5 MGD	5MGD	5MGD
3. Environmental Quality				
Air	No change.	The only potential source of air pollution would be from pump station(s). Pursuant to rule 62-210.300(3)(a)(21)(b), determine if stations will be exempt from air permitting or if an air general permit will be required.	Same	Same
Noise	No change.	Pump station must comply with all OSHA and/or any local noise limits.	Same	Same
Water Quality	Likely increase in contaminated urban run-off as development increases; however, no detectable net water quality degradation due to expansion of stormwater collection infrastructure.	Project will not adversely impact water quality. All water quality standards will be monitored and met.	Same	Same
Vegetation	Agricultural crops will be replaced with ornamental plantings.	Exotic vegetation and agricultural crops will be replaced with native upland and wetland species.	Same	Same
Threatened and Endangered Species	No change.	Protected species will benefit and increase.	Same	Same

IMPACT ASSESSMENT	No Action Alternative	Alternative 1 Winsberg Intermediate Hydroperiod	Alternative 2 Winsberg Short Hydroperiod	Alternative 3 Winsberg Long Hydroperiod
Wading Birds	No change.	Wading birds will increase.	Same	Same
Cultural Resources& Historic Properties	No change.	No adverse impact.	No adverse impact	No adverse impact
Water Supply	Would be increase in water demand as agricultural land would be replaced with high density residential development.	Will add water to the natural system that would have been lost to deep well injection.	Same	Same
Land Use	Agricultural land use would be replaced with urban development.	Agricultural land will be replaced with wetlands and wildlife habitat.	Same	Same
4. Regional Economic Development (RED)	Shift from pasturelands to urbanized area. Increase in county tax roles.	Short-term increase in job creation and sales generated due to construction.	Same	Same
5. Other Social Effects (OSE)				
Environmental Justice	No change.	No minority or low income populations have been identified in the project area or its impact area	Same	Same
Recreation	No change.	Site provides additional educational and recreational opportunities.	Same	Same

SECTION 7
*ENVIRONMENTAL EFFECTS

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7.0 ENVIRONMENTAL EFFECTS

7.1 ENVIRONMENTAL EFFECTS OF THE SELECTED PLAN

This section is the scientific and analytic basis for the comparison of alternatives. The following section includes anticipated changes to the existing environment, including direct, indirect and cumulative effects. **Table 7-1** summarizes the consequences of the proposed action and the no-action alternative. Consequences to particular resources are discussed in more detail below.

7.1.1 Proposed Action and No-Action Alternative

The proposed plan entails conversion of 150 acres of former farmland at the Winsberg Farm site to a constructed wetland system. The area actually hydrated to create the wetland will be 114 acres and the other 36 acres would be interior berms, exterior embankments, an environmental education/visitors center and a parking lot. The wetland would largely resemble the nearby Wakodahatchee Wetlands and include a mosaic of deepwater, upland and emergent marsh zones. The water source for wetland hydration would be the Southern Region Water Reclamation Facility (SRWRF), and water would exit the site through evapotranspiration and seepage. Upland, wetland and deepwater zones would be vegetated with appropriate native plant species. All existing features on the Winsberg Farm site would be moved or demolished. The site would be contoured to create perimeter and internal berms, shelves and deepwater zones.

Under the no-action alternative, the Winsberg Farm site would likely be converted to a suburban development within the next five years.

TABLE 7-1: SUMMARY OF POTENTIAL AND ALTERNATIVE IMPACTS

Environmental Factor	Proposed action (114-Acre Wetland -- Winsberg Farm Site)	No-Action Alternative
Soils	Considerable soil disturbance is expected during construction as the site is contoured. Hydric soil characteristics are expected to eventually develop in inundated areas.	Soils will be disturbed as site is converted from agriculture to a suburban development.
Topography	Considerable change expected as the relatively flat agricultural site is contoured to create the wetland area, deepwater zone and levees.	Change is possible as the relatively flat agricultural land is converted to a suburban development.
Wetlands	About than 114 acres of emergent marsh created along with upland and deepwater zones.	No high-quality wetland habitat will be created.
Hydrology	No adverse impacts expected. Average project inflow = 6.2 cfs. Average project infiltration = 3.1 cfs.	Would alter hydrology. Average project inflow = 0 cfs. Average project infiltration = 0 cfs
Vegetation	Exotic vegetation and agricultural crops will be replaced with native upland and wetland species.	Agricultural crops will be replaced with buildings and ornamental plantings.
Fish and Wildlife Resources	Terrestrial and aquatic species are expected to benefit from the upland, wetland and deepwater habitat created.	Fish and wildlife habitat expected to decrease as agricultural land is converted to suburban development.
Threatened and Endangered Species	No adverse impacts expected. Protected species are expected to benefit from the habitat created.	This land is currently not habitat for any of the 4 federally listed species. This will not change as urban development continues.
Air Quality	The only potential, direct source of air pollution would be from pump station emissions. Adverse effects from associated engines are expected to be negligible. However, the use of the property as wetland instead of the future without project of residential and/or commercial land would serve to reduce auto (and other emissions) in the immediate area.	No potential adverse impacts to ambient air quality due to the absence of emissions from pump stations.
Noise	Pump station must comply with all OSHA and/or any local noise limits.	No change.
Water Supply*	5,600 acre feet/year	0 acre feet/yr
Water Quality	Water-quality compliance of respective SRWRF and wetland treatment-area effluents to be achieved, in accordance with existing (and future modifications of) Water Quality Certification/Permit.	Likely increase in contaminated urban runoff as development increases; however, no detectable net water quality degradation due to expansion of stormwater collection infrastructure.

Socio-Economics		
Land Use	Area will be changed from row crops to a wetland site.	Area will be converted to suburban development.
Population	No adverse impacts are expected. Population will increase.	Population will continue to increase as area is converted to suburban development.
Recreation	Increased recreation opportunities will be provided on site (nature observation).	No existing recreation on the site.
Tax Base	No adverse impact on the existing tax base.	Tax base will increase due to suburban development.
Water Demand	No adverse impacts on water demands or water supply.	Water demands will increase due to suburban development.
Hazardous, Toxic and Radioactive Waste	No adverse impact from HTRW is expected.	Potential new sources of HTRW with urban development.
Aesthetics	Visual and audible impacts during construction. Visual change as row crops converted to a wetland site. A continuous perimeter berm will provide a visual buffer from surrounding properties.	Visual impact as row crops are converted to suburban development.
Cultural Resources	No adverse impacts to cultural resources.	No adverse impacts to cultural resources.

*Water supply is the amount of water the project adds to the natural system by percolation to groundwater.

7.2 VEGETATION

In the proposed plan, exotics and agricultural plants would be replaced with native wetland and upland plant species, providing habitat for a greater array of species. There would also be routine maintenance to keep out invasive plant species similar to the method currently used at Wakodahatchee Wetlands. Palm Beach County Water Utilities Department (PBCWUD) horticulturist Mike Rawls spoke of a yearly contract to provide weekly maintenance at Wakodahatchee Wetlands. This includes spraying for invasive plant species, such as torpedo grass, cattails, Australian pine, Brazilian pepper, smartweed, alligator weed, etc. This kind of maintenance, however, would need to be more intense for a new wetland.

The no-action alternative would result in a conversion of the vegetation on the project site from the agricultural crops to the buildings, lawns and ornamental plantings associated with suburban development, accompanied by a decrease in native vegetation and wildlife habitat.

7.3 FISH AND WILDLIFE

As informational materials published by the PBCWUD explain, the Wakodahatchee site was designed for a mixture of habitat types listed below:

- Open pond-water areas to attract waterfowl and diving birds;
- Emergent marsh areas for rails, moorhens and sparrows;
- Shallow shelves for herons and egrets;
- Islands with shrubs and snags to serve as roosting, nesting and basking sites; and
- Forested wetland areas for long-term habitat development.

The Wakodahatchee web site is a valuable source of public information and can be found at the following Internet location:

http://www.pbcwater.com/wakodahatchee/what_is_wakodahatchee.htm

The web site also indicates that an abundant variety of other wildlife also utilize the wetland site, including southern leopard frogs (*Rana utriularia*), pig frogs (*Rana grylio*), Florida redbelly turtles (*Psuedemys nelsoni*), Florida soft-shell turtles (*Apalone ferox*), peninsula cooters (*Pseudemys floridana peninuslaris*), black racer (*Coluber constrictor*), American alligator (*Alligator mississippiensis*), marsh rabbit (*Sylvilagus palustris*), eastern cotton-tail rabbit (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), and river otter (*Lutra canadensis*). It is expected that the proposed Winsberg Farms project will support a similar array of species. The wetlands are also visited or inhabited by at least 120 species of birds, listed in **Table 7-2** on the next page.

Conversely, the no-action alternative will not provide any benefit to fish and wildlife resources.

TABLE 7-2: BIRDS SPOTTED AT THE WAKODAHATCHEE WETLANDS

Grebes Pied-Billed Grebe	Shrikes Loggerhead Shrike	Vireos White-Eyed Vireo
Kinglets and Gnatcatchers Blue-Bray Gnatcatcher	Tanagers Summer Tanager	Cuckoos and Anis Yellow-Billed Cuckoo Smooth-Billed Ani
Starlings and Waxwings European Starling Cedar Waxwing	Swifts and Kingfishers Chimney Swift Belted Kingfisher	Jays and Crows Blue Jay Fish Crow
Wrens House Wren Sedge Wren Marsh Wren	Owls and Goatsuckers Eastern Screech Owl Great Horned Owl Common Nighthawk	Pelicans and Allies Brown Pelican Double-Crested Cormorant Anhinga
Sparrows Eastern Towhee Savannah Sparrow Swamp Sparrow	Woodpeckers Red-Bellied Woodpecker Downy Woodpecker Northern Flicker	Flycatchers Least Flycatcher Eastern Phoebe Eastern Kingbird
Thrashers American Robin Gray Catbird Northern Mockingbird Brown Thrasher	Pigeons and Doves Eurasian Collared Dove White-Winged Dove Mourning Dove Common Ground Dove	Ibises, Spoonbill and Stork White Ibis Glossy Ibis Roseate Spoonbill Woodstork
Grosbeaks and Allies Northern Cardinal Rose-Breasted Grosbeak Indigo Bunting Painted Bunting	Blackbirds, Grackles, Cowbirds and Orioles Bobolink Red-Winged Blackbird Common Grackle Boat-Tailed Grackle Shiny Cowbird Brown-Headed Cowbird	Martins and Swallows Purple Martin Barn Swallow Tree Swallow Northern Rough-Winged Swallow Bank Swallow
Rails, Gallinules, Coots and Cranes Limpkin Virginia Rail Yellow Rail Sora Purple Gallinule Common Moorhen American Coot Sandhill Crane	Gulls and Terns Laughing Gull Boneparte's Gull Ring-Billed Gull Herring Gull Lesser Black-Backed Gull Caspian Tern Forster's Tern Gull-Billed Tern Least Tern Black Tern	Warblers Northern Parula Yellow-Rumped Warbler Pine Warbler Prairie Warbler Palm Warbler American Redstart Northern Water Thrush Common Yellowthroat Wilson's Warbler
Herons, Egrets and Allies American Bittern Least Bittern Great Blue Heron Great Egret Cattle Egret Snowy Egret Tricolored Heron Little Blue Heron Green Heron Black-Crowned Night Heron	Vultures, Hawks and Allies Black Vulture Turkey Vulture Osprey Bald Eagle Northern Harrier Sharp-Shinned Hawk Cooper's Hawk Red-Tailed Hawk Red-Shouldered Hawk American Kestrel Merlin Peregrine Falcon	Waterfowl Snow Goose Wood Duck Green-Winged Teal Mottled Duck Blue-Winged Teal Northern Pintail Northern Shoveler American Widgeon Gadwall Ring-necked Duck Redhead Hooded Merganser Ring-necked Teal Ruddy Duck Black-bellied Whistling Duck
Shorebirds Black-bellied Plover Semipalmated Plover Killdeer Black-necked Stilt Greater Yellowlegs	Shorebirds, Continued Lesser Yellowlegs Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper Western Sandpiper Least Sandpiper	Shorebirds, Continued Pectoral Sandpiper Dunlin Stilt Sandpiper Long-Billed Dowitcher Short-Billed Dowitcher Common Snipe

7.4 EMERGING POLLUTANTS OF CONCERN

The ecological and human health impact of Emerging Pollutants of Concern (EPOCs) in wastewater effluent has in recent years come to the attention of scientists and environmental regulators. In the future, it is likely that reuse applications will be evaluated for their impact in discharging trace levels of the EPOCs. These EPOCs include steroids and hormones, veterinary and human antibiotics, prescription drugs, non-prescription drugs, and other wastewater-related compounds. Many of these compounds can be found at low concentrations in treated wastewater and sometimes in potable water. No information on EPOC concentrations is currently available for the effluent from the SRWRF.

Our assessment of the project's benefits and impacts to fish and wildlife resources will evolve with the emerging science related to EPOCs. A post-project monitoring plan that includes sampling for these constituents will also be developed.

7.5 THREATENED AND ENDANGERED SPECIES

The proposed action is not likely to adversely impact threatened and endangered species in the project area. This determination was made and coordinated with the U.S. Fish and Wildlife Service. In December 2005, the Service concurred with the Corps' determination. On the contrary, it is expected that the proposed action will be slightly beneficial to protected species by providing additional habitat. Several species listed by the state of Florida and the federal government have been recorded at the nearby Wakodahatchee Wetlands: wood stork, bald eagle, roseate spoonbill, limpkin, little blue heron, snowy egret, tricolored heron, white ibis, Florida sandhill crane, osprey and American alligator. The species would be similarly expected to visit and utilize the proposed project site, which is nearly approximately three times as large as Wakodahatchee Wetlands.

The no-action alternative will not provide any benefit to listed species.

7.5.1 Wood Stork

Since wood storks probably feed on or near the project site, individual birds may be disturbed during the construction of the proposed wetland. In the long-term, the conversion of the agricultural project site to a constructed wetland is expected to provide additional foraging habitat for wood storks and other wading birds nesting in LNWR. Wood storks are not expected to forage exclusively on the project site and, therefore, are not likely to be adversely affected by residual soil contaminants (USFWS, 2005). Wood storks nest in colonies in treetops. Based on the relatively small size of the site, the lack of tall tree stands, and the surrounding land use, it is considered unlikely that the proposed, constructed wetland will be utilized by wood storks for nesting purposes.

Since the project will increase the foraging area available to wood storks, and given the construction-related protection measures adopted, it is expected that the proposed wetland construction project may affect, but is not likely to adversely affect, the wood stork.

7.5.2 Everglade Snail Kite

It is possible that the apple snail, primary forage animal for the endangered Everglade snail kite, will inhabit the freshwater marsh established by the project, providing additional foraging habitat for the Everglade snail kite. Snail kites are not expected to forage exclusively on the project site and, therefore, are also not likely to be negatively affected by any residual soil contaminants (USFWS, 2005). Based on the relatively small size of the site, the lack of contiguous foraging habitat, and the surrounding land use, it is considered unlikely that the proposed constructed wetland will be utilized by snail kites for nesting purposes. Construction activities are not expected to impact the snail kite.

The Winsberg Farms project may increase the foraging area available to snail kites, so it is expected that the proposed wetland construction project may affect, but is not likely to adversely affect, the Everglades snail kite.

7.5.3 Bald Eagle

The deepwater areas created as part of the wetland construction are expected to provide bald eagle foraging habitat. Similar to the wood stork and Everglades snail kite, bald eagles are also not expected to forage exclusively on the project site and, therefore, are not likely to be adversely affected by residual soil contaminants (USFWS, 2005). Bald eagles are not expected to nest on the constructed wetland site due to lack of suitable nesting trees. Construction activities are not expected to impact bald eagles.

Since the project may increase the foraging area available to bald eagles, it is expected that the proposed wetland construction project may affect, but is not likely to adversely affect, the bald eagle. Subsequent to coordination of this determination with FWS, the bald eagle was removed from the Federal endangered species list on July 9, 2007. It is still protected by the Bald and Golden Eagle Protection Act.

7.5.4 Eastern Indigo Snake

Since indigo snakes may already inhabit the project site, temporary impacts to the indigo snake may occur during construction. It is possible that eastern indigo

snakes will inhabit upland berms and tree islands associated with the constructed wetland project.

The project may provide indigo snake habitat, and given the construction-related protection measures adopted, it is expected that the proposed wetland construction project may affect, but is not likely to adversely affect, eastern indigo snakes.

7.6 TOPOGRAPHY AND SOILS

Soils on the Winsberg site would be altered in either the no-action or future-with-project cases.

In the case of the proposed plan, considerable soil disturbance is expected during construction as the relatively flat agricultural site is contoured to create project berms and deepwater zones. Moreover, hydric soil characteristics would be expected to eventually develop in the inundated areas of the site. Considerable change in topography is also expected as the agricultural site is contoured to create the wetland area, deepwater zone and berms. Deep zones will be utilized to provide fill soil for berms, islands and other design features. External berms will be 26.5 feet National Geodetic Vertical Datum 1929 (NGVD 29), internal berms at 23 feet, marsh grades at 16-19.5 feet, and deep zones at 15 foot bottom. Typical marsh grades will be one foot below the average wetland water surface, and islands will peak three feet above the average wetland water surface.

According to the Natural Resources Conservation Service (NRCS), prime farmland is defined as "*land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides and labor, and without intolerable soil erosion*" (7U.S.C. 4201(c)(1)(A)). Unique farmland is defined as "*land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as, citrus, tree nuts, olives, cranberries, fruits and vegetables*" (7 U.S.C. 4201(c)(1)(B)). Soils in the Winsberg Farms area are both prime and unique farmland. There will be definite effects on this farmland with the creation of a wetland, according to the NRCS, who will coordinate notification and concurrence of affected land areas. The Corps submitted a Farmland Conversion Impact Rating form (Form AD-1006) to the NRCS for this project on February 7, 2005. The total number of acres to be converted directly is 140; the total number of acres of the site is 200. The total number of acres of prime and unique farmland is plus or minus 140. The relative value of farmland to be converted is 77%.

In the case of the no-action alternative, soils would be disturbed as the site is converted from agriculture to suburban development.

7.7 AIR QUALITY

Given the fact that none-to-little pumping capacity is to be added as part of the wetlands restoration project, an air emissions permit (per state rule 62-210.300(3)(a)(21)(b)), is not expected to be required. However, if pumping capacity is added, the sponsor will be responsible for determining if an air general permit (operating license) will need to be acquired from PBCHD's air pollution permitting section -- the Environmental Health and Engineering Section. If that application needs to be made for a PBCHD operating license, the sponsor will be required to apply for a Title V source air permit either immediately before or following completion of construction.

Odor is an air quality concern typically associated with wastewater treatment. This secondary parameter will be controlled to satisfy state and local requirements, in accordance with the existing domestic wastewater permit (No. FLA041424, March 2004).

Currently, permit review is handled by the Environmental Health and Engineering Section of the County's Department of Health through whom application would need to be made for an air permit. Staff has been contacted, and currently there are no air quality concerns pertaining to the Winsberg Farm Restoration Project.

7.8 WETLANDS

Since no wetlands currently exist on the Winsberg Farm site, no adverse impacts to existing wetlands would occur under either the proposed plan or the no-action alternative. The proposed plan would actually increase the spatial extent of wetlands in the project area through the creation of more than 100 acres of emergent marsh, in addition to connected upland and deepwater habitat. The no-action plan would not be expected to increase the spatial extent of wetlands.

7.9 HYDROLOGY

The no-action alternative would alter the hydrology of the site for the construction of wetland/advanced wastewater treatment facilities in support of residential and commercial development. There are also benefits. The average daily flow to the Winsberg project on an annual basis is estimated to be 3-5 MGD per day, or 3,360-5,600 acre-feet per year. About 50%-75% of the 3-5 MGD per day of water would be lost due to evapotranspiration. The remainder will contribute to maintaining LWDD groundwater and canal elevations, and thereby reduce consumptive use of an equal amount of water that is obtained from the natural system.

7.10 WATER SUPPLY

The Southern Region Water Reclamation Facility (SRWRF) is designed to produce a secondarily treated, high-level, disinfected effluent. Flows will be discharged onto Winsberg Farm using four existing and one new 10,500 gpm, two-stage, master effluent pumps that will transfer effluent to two on-site deep wells, reclaimed effluent filters, Winsberg Farm and Wakodahatchee Wetlands, and to the Site 3 deep-injection well. Secondary treatment of flows for reuse, land application and/or groundwater discharge (including underground injection) must result in an effluent that, at a minimum, contains not more than 20 mg/L CBOD5 and 20 mg/L TSS, or 90 percent removal of each of these pollutants from the wastewater influent, whichever is more stringent. Furthermore, appropriate disinfection and pH control of effluents is also required.

According to FAC 62-600.420(1)(d), Minimum Treatment Standards -- Technology Based Effluent Limitations (TBELs), groundwater discharge via underground injection, the secondary treatment criteria specified in Rule 62-600.420(1)(a), F.A.C., at a minimum, applies to all facilities utilizing Class I wells injecting domestic effluent into Class G-IV waters. Furthermore, the design of new facilities and modification of existing facilities to achieve pollutant reduction to levels beyond that specified by secondary treatment is required before discharge to Class I waters. Therefore, the water quality improvement between the secondarily treated effluent (at the end of the treatment plant pipe) and the (downstream) flows applied to and "treated" by the wetlands describes the anticipated improvement during post-project operations. The Winsberg Farm wetlands project must ensure that the water seeping into the groundwater meets primary and secondary drinking water standards. Essentially, the above-mentioned Domestic Wastewater Facility Permit (FLA041424, March 2004) mandates that PBCWUD improvements achieve Winsberg Farm project goals of meeting primary/secondary drinking water-standard limitations. The 30-day PBCWUD sampling project (September 2002) supported Winsberg project assumptions with regard to water quality. The test-case monitoring of Wakodahatchee Wetlands revealed that Southern Regional Reuse Facility (SRWRF) effluent clearly exceeds all primary/secondary drinking-water standard limitations by a large margin, except for odor and color, which are less than the values found in Canal L-30. In short, no adverse impact to the water supply is anticipated from the Winsberg Farm project.

7.11 WATER QUALITY

The proposed wetlands would assimilate nutrients and improve water quality through natural biological, chemical and physical processes. The PDT determined that the following performance measures should be used to evaluate project alternatives:

1. Performance Measure Meet Ch. 62-600, FAC standards for groundwater quality;
2. Performance Measure Meet Ch. 62-620, FAC standards for surface water quality
3. Performance Measure Water quality improvement within Wakodahatchee Wetlands; and
4. Performance Measure Benefits of replacing stormwater runoff from existing agricultural land with stormwater storage and treatment using existing farmland.

7.11.1 Nutrient Removal

Natural processes of nitrogen assimilation and denitrification, as well as phosphorus assimilation and sedimentation are estimated to significantly improve water quality. This greatly reduces nutrient concentrations in water reaching the eastern section of the wetland or water infiltrating into the groundwater.

Table 7.3 summarizes predicted nitrogen and phosphorus removal rates by the Winsberg Farm Wetlands Restoration Project. Removal rates were modeled using the first-order, area-based, treatment wetland design model (Kadlec and Knight, 1996). Model assumptions included a wetland area of 150 acres, 2 MGD of inflow, assumed nitrogen and phosphorus inflow concentrations based upon known performance of the SRWRF, and global-average estimates of pollutant removal rates described in Kadlec and Knight (1996).

TABLE 7-3: NUTRIENT REMOVAL PERFORMANCE

Parameter	Alternative 1: Fluctuating Water Level Wetland
Nutrient Loading	(lbs/day)
Total Phosphorus Load (a)	35.0
Total Nitrogen Load (b)	458.0
Nutrient Removal	
Total Phosphorus Retention (c)	30.1
Total Nitrogen Retention (d)	413.0
Notes:	
(a) Assumed Total P concentration to Phase 1 (mg/L)	2.1
(b) Assumed Total N concentration to Phase 1 (mg/L)	27.5
(c) Assumed Total P retention by plant uptake and sedimentation	86%
(d) Assumed Total Nitrogen removal by denitrification, ammonia volatilization, and plant or microbial assimilation, k=22 m/yr. C*=1.5 mg/L	90%
Assumed total inflow to combined Phases 1 and 2 (MGD)	2.0

*(Abridged) Nutrient Removal Performance for the Eastern Portion of the Winsberg Farm Wetlands Restoration Project

For the assumed flow and input concentration for Alternative 1, the model predicted 86 percent reduction of total phosphorus and 90 percent reduction in total nitrogen. Total mass removal of nitrogen and phosphorus was 30 pounds/day and 413 pounds/day, respectively. See **Table 7-3** for Alternative 1's nutrient removal performance.

The following list of constraints regarding water quality was developed on the basis of PDT discussions during the course of the project to date:

- Waters leaving the site through seepage and percolation to groundwater must comply with discharge standards for groundwater.
- Waters leaving the site by way of surface overflow (if any) must comply with discharge standards for surface water.
- The Fall 2002 Water Quality Certification (WQC) process conducted by the PBCWUD for review by the Florida Department of Environmental Protection (FDEP) resulted in a state authorization of operations of the proposed wetland restoration features at Winsberg Farm. In the Domestic Wastewater Facility Permit (FLA041424, March 2004) issued to the PBCWUD, FDEP authorized the operation of the Winsberg Farm Manmade Wetlands Reuse System for the 75-acre (Phase I) portion of the total 175-acre, manmade wetlands area. Authorization for Phase II (45-acre, eastern end of the project) is ultimately to be incorporated into the

same permit pending a request for permit modification that will consist of the Phase II design

- PBCWUD demonstrated that it could successfully meet key wetland reuse system water quality limitations upon completion of its FDEP-approved monitoring effort (every three days) at Wakodahatchee for the period of August 26 through September 22, 2002. The rationale behind this demonstration is that since the Winsberg manmade reuse system was being modeled after the Wakodahatchee prototype, the quality of effluent produced would be similar. This monitoring effort was the final major piece of the PBCWUD's Domestic Wastewater Facility Permit application. Monitoring results are as follows:
    - Treated secondary effluent from the Southern Region Water Reuse Facility (SRWRF) meets all primary/secondary drinking-water standards except for odor and color.
    - All other samples collected from the other locations meet all primary/secondary drinking-water standards except for color, iron and odor (although the values for the latter parameters were less than the background values).
    - There are no signs of any Total Coliform present in the reclaimed water or any of the four groundwater monitoring wells at the perimeter of the Wakodahatchee Wetlands.
    - Low values (0-380 cfu/ml) of Total Coliform were present in the SRWRF secondary effluent as expected, and these values are considerably less than the adjacent surface-water bodies, such as Conveyances L-30 & L-31 which varied from 30-7,000 cfu/1000 ml.
    - Higher values of Total Coliform were found in Wakodahatchee Wetlands' ponds AG&I due to the presence of many different wildlife species that have chosen this wetland as their habitat.
    - There are no signs of any Fecal Coliform present in any of the four groundwater monitoring wells at the perimeter of the Wakodahatchee Wetlands, nor in the SRWRF effluent or reclaimed water.
    - Higher values of Fecal Coliform were present in Wakodahatchee Wetlands' ponds AG&I due to the presence of many different wildlife species that have chosen this wetland as their habitat.
    - Fecal Coliform counts in Conveyances L-30 and L-31 varied between 4-800 cfu/100 ml.
    - Total Nitrogen values in monitoring wells varied from 1.4 to 9.6 mg/l. However, as indicated in Table 7-3, Nitrate (permitting requirement) values vary from less than 0.02 to 2.1 mg/l, which is considerably less than the limit of 10 mg/l.
    - Total Nitrogen values in SRWRF secondary effluent varied from 25.2 to 32.3 mg/l, and from 23.8 to 30 mg/l in the reclaimed water.

- Total Nitrogen values in pond AG&I varied from 3.1 to 12.1 mg/l, indicating the capability of wetland vegetation in removing nutrients.
- The turbidity values in SRWRF effluent varied from 2.9 to 4.14 Nephelometric Turbidity Units (NTU) and from 0.67 to 2.31 NTU in reclaimed water. These values are considerably less than the turbidity values of 3.58 to 11.5 NTU found in Canals L-30 and L-31.
- The Chlorine Residual values in SRWRF effluent varied from 0.24 to 3.20 mg/l, and from 1.8 to 6.8 mg/l in reclaimed water.

Total Phosphorus results were not included in the 2002 PBCWUD WQ Analytical Results Report to FDEP. However, SRWRF effluent values were reported in the 1999 PBCWUD Underground Injection Control (UIC) WQ Comparison Report at 1.4 mg/l.

FDEP issued a permit for Phase I under Chapter 62-600, F.A.C., "Domestic Wastewater Facilities," and Chapter 62-520, F.A.C., "Ground Water Classes, Standards, and Exemptions"; thus satisfying the federal requirements of the Clean Water and Safe Drinking Water Acts, respectively.

7.12 SOCIO-ECONOMICS

7.12.1 Land Use

Lands acquired with state and federal dollars for the purpose of this restoration project would be converted from agriculture to wetlands. The land in the study area would not be used for development purposes with the recommended plan implementation and would provide environmental benefits and much more closely resemble predevelopment conditions. The surrounding residential areas will experience a large population increase and therefore an increase in infrastructure.

7.12.2 Population

The recommended plan is not expected to limit the growth potential of Palm Beach County. Project lands are otherwise expected to develop in proportion to the rest of the county in the study area. Only about 175 fewer acres will be available to support development in Palm Beach County through 2060. Lands in adjacent areas are expected to gradually convert from the present mix of residential, commercial, vacant, and agriculture to fully-developed.

Development of adjacent lands will increase demands on regional water supply, recreational use demand on state and federally owned lands, and increase pressure on native wildlife and their habitats. The complex of federal and state forests, refuges and preserves will play an ever-increasing and critical role in the

survival of native vegetation types and species, as undeveloped and unprotected habitats disappear under golf courses, residential tracts, and commercial-industrial sites.

7.12.3 Recreation

The Winsberg Farm wetlands can support a significant amount of outdoor recreation in the LEC of Florida. It is not possible at this time to anticipate precisely how expenditures and consumer surplus associated with Winsberg-related recreation would change with the recommended plan. However, it can be concluded that by creating a wetland, there will be minimally increased recreation-based businesses and activities (for instance, businesses supporting binoculars, bird books and feeders). Future recreational activities will be environmentally friendly activities and will not contribute to future detriment of the ecosystem.

7.12.4 Tax Base

The county tax base will not be negatively affected by the construction of the Winsberg Farm wetlands. The land would have been otherwise developable, but other areas of the county will develop at a quicker rate to account for the increase in population. The lack of development on the site will cause an insignificant impact on the county's tax base, and the recreation and increased development around the site may offset the lack of site development.

7.12.5 Water Demand

Under all alternatives, water demands will rise due to an increase in population. With the implementation of the recommend plan, groundwater levels are not expected to increase, nor will water be stored for consumption, leading to no increase in supplies of water and, therefore, no effect on water demands.

While the project will have no effect on water demand, the SFWMD requires the development of water conservation plans as a prerequisite for water utilities to obtain a water-use permit. With the implementation of conservation plans, water demand should change. Most conservation plans incorporate passive water conservation measures that include increasing block rate structures, the required use of ultra-low flow water fixtures on new or renovated construction, restrictions on lawn watering, requiring rain sensors on automatic sprinkler systems, a leak detection program, and public education concerning water conservation measures.

7.13 AESTHETICS

The use of construction equipment to build the constructed wetland would have a temporary negative impact on visual and audible aesthetics. However, these impacts would cease at completion of project construction. A more lasting change would be seen in the appearance of the project site as it is converted from an agricultural site to a more natural wetland system. A significant increase in native plant cover and wildlife usage should contribute to the aesthetics of the project site. Regardless, a continuous perimeter berm will provide a visual buffer from surrounding properties.

The no-action alternative, mixed development would also adversely impact local aesthetics. The temporary impacts would be associated with site development and would cease once construction is complete. The lasting change would be seen in conversion of the farm to a suburb.

7.14 HAZARDOUS, TOXIC AND RADIOACTIVE WASTE

The project site should not be impacted by any HTRW contributions during construction since required measures will be used to contain and avoid discharge of any contamination.

7.15 NOISE

Pump stations must comply with all OSHA and/or any local noise limits. It is not expected that the pump stations will have a significant impact on noise levels. There could be short-term noise impact during construction. However, once the project is constructed and the aquatic habitat develops as an active wetland, the noise levels will be less than existing or future without conditions. This is an additional benefit from the project.

7.16 CULTURAL RESOURCES

A Phase I Cultural Resource Survey of the Winsberg Farm property was conducted on February 14, 2003, by a USACE contractor. The survey concluded that the project should have no effect on any cultural resources listed, or eligible for listing, on the National Register of Historic Places. No further evaluation, documentation or fieldwork was recommended.

In addition, a review of the Florida Master Site files indicated no reported cultural resources in the project area. In a letter dated December 11, 2002, final consultation with the State Historic Preservation Officer (SHPO) for the Winsberg Farm, has determined the project will have no effect on cultural resources. Consultation with the SHPO for the alternative sites will be

unnecessary, given that the alternative sites have been found to not be cost effective and is also not accepted by the local sponsor.

7.17 MITIGATION REQUIREMENTS

Mitigation for adverse environmental or economic (increases in flood damage) effects is not required. Mitigation features are not included in the recommended plan. The project will result in the conversion of an agricultural site to a wetlands/upland mosaic, in imitation of a natural area, providing deepwater, wetland and upland habitat for fish and wildlife. The creation of fish and wildlife habitat more than offsets the loss of degraded fish and wildlife habitat in the old agricultural drainage canals on project lands. The project will not increase flood damage.

7.18 PUBLIC HEALTH

The preferred alternative will not cause adverse public health impacts. The wastewater has been used at the Wakodahatchee Wetlands without any known negative impacts on public health. While there will be an increase in levels of coliform bacteria as a result of wildlife using the wetlands, there will not be any direct human contact with the water. Based on groundwater monitoring at the Wakodahatchee Wetlands, an increase in coliform bacteria in groundwater is not expected. That monitoring is in part the basis for FDEP's issued Water Quality Permit for the Winsberg Farm Wetlands.

7.19 ENVIRONMENTAL COMMITMENTS

USACE, its non-federal sponsor -- the PBCWUD, and contractors commit to avoiding, minimizing and mitigating for adverse effects during construction activities by:

1. Employing best management practices with regard to erosion and turbidity control. Prior to construction, the construction team should examine all areas of proposed erosion/turbidity control in the field, and make adjustments to the plan as warranted by actual field conditions.
2. Informing contractor personnel of the potential presence of threatened and endangered species in the project area, the need for precautionary measures and the Endangered Species Act prohibition on taking listed species.
3. Incorporating Standard Protection Measures and procedures found in Habitat Management Guidelines for Wood Stork in the Southeast Region as recommended in the USFWS DCAR and in Corps of Engineers standard contract specifications for Jacksonville District.
4. Excavating and using the top six inches of soil in the construction of tree islands or exterior ditch/berm. The excavated soil will be capped with a

minimum of six inches of soil obtained from a deeper stratum to prevent exposure of residual contaminants to wildlife species.

5. Contract specifications will prohibit the contractor from dumping oil, fuel or hazardous wastes in the work area and will require that the contractor adopt safe and sanitary measures for the disposal of solid wastes. The contractor will prepare a spill prevention plan.

7.20 CUMULATIVE IMPACTS

Cumulative impact is the "*impact on the environment that results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or persons undertaking such actions*" (40 CFR 1508.7). The project, combined with other nearby planned features of the Comprehensive Everglades Restoration Plan (i.e., the Everglades Construction Project (i.e., STA-1E), and existing features (i.e., Wakodahatchee Wetlands and Loxahatchee National Wildlife Refuge), will not result in cumulative negative impacts to the system. Instead, these projects will work in concert to enhance the local environment and the South Florida ecosystem. There will be continued urban development in the project area that will impact the environment. Construction of the preferred alternative will not constrain the capacity of the Regional Wastewater treatment plant, as deep well injection will continue to be an option for peak production rates; but the new wetlands will significantly increase fish and wildlife habitat and wildlife-related educational and recreational opportunities in this sector of Palm Beach County.

7.21 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Construction of the proposed project will include many features considered permanent such as levees, berms and water-control structures. Federal and local monetary resources would also be expended to purchase lands, provide labor, energy, materials and equipment to construct and maintain the wetland.

7.22 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Geology and soils will be modified through excavation of the site and creation of the wetland system. Local disturbances to fish and wildlife are expected from construction activities.

7.23 RELATIONSHIP BETWEEN SHORT-TERM USE AND LONG-TERM PRODUCTIVITY

The project land's short-term use is that of an agricultural field. Its long-term use and associated productivity would be that of a constructed wetland system that would provide fish and wildlife habitat.

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SECTION 8
PLAN IMPLEMENTATION

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8.0 PLAN IMPLEMENTATION

8.1 INSTITUTIONAL REQUIREMENTS

8.1.1 Division of Implementation Responsibilities

8.1.1.1 Project Implementation Report

The Winsberg Farm PIR contains all project-specific requirements for PIRs outlined in 33 CFR 385.26 and Section 601(h)(4)(A)(iii) of the Water Resources Development Act of 2000 (WRDA 2000), including sub-clause (V) which states that the PIR shall "identify the amount of water to be reserved or allocated for the natural system …." Furthermore, Section 601(h)(5) of WRDA 2000 (the Savings Clause) requires that existing legal sources of water may not be transferred or eliminated until a new source of comparable quantity and quality is available. Additionally, the Savings Clause provides that CERP implementation shall not reduce levels of service for flood protection that are in accordance with applicable law and in existence on the date of enactment of WRDA 2000. Section 601(h)(4)(c)(I) of WRDA 2000 also requires an operating manual that is consistent with the reservations described in the PIR. The PIR is in compliance with NEPA, and all water-quality standards and permitting requirements. The TSP was selected based on the cost-effectiveness and engineering feasibility of the project, and best available science.

8.1.1.2 Project Cooperation Agreement

Palm Beach County, Florida and the Federal government will enter into a binding agreement for local cooperation prior to implementation of the project.

The Project Cooperation Agreement (PCA) will include provisions that are unique to the specific projects and will be executed only after all applicable requirements of Federal and state laws have been met.

The Phase 1 features of the TSP were constructed by the non-federal sponsor prior to authorization of the project or signing of the PCA. Under the provisions of Section 601(e)(5)(B) of the Water Resources Development Act of 2000, Public Law, as amended by Section 6004 of the Water Resources Development Act of 2007, Public Law, the non-Federal sponsor may be entitled to receive credit for its planning, design and construction of the Phase 1 features if those features are determined by the Secretary to be integral and necessary for the Project and for a reasonable cost. Additionally, the work must meet Federal standards and the costs must be reasonable, necessary, auditable and allocable. Any in-kind credit provided is limited to the non-Federal share of the Project and can not result in a reimbursement.

8.2 COST SHARING

Responsibilities for implementing the recommended plan will be shared by USACE, on behalf of the federal government, and the non-federal sponsor, Palm Beach County, Florida. USACE and the non-Federal Sponsor will cost share equally in the design of projects resulting from this plan. The non-Federal sponsor will acquire and furnish necessary lands, easements, rights of way, relocation, and disposal areas (collectively referred to as LERRD); and operate and maintain the completed project. Construction contracts to build the projects will be managed by either USACE or Palm Beach County to maintain a 50-50 cost. Rules, which determine how project responsibilities are shared, are established in federal law and related administration implementing policies. Section 601 of WRDA 2000 provides in-kind cost sharing for the non-federal sponsor for design, construction and operations and maintenance, and for treatment of credit between projects to maintain a 50/50 cost share.

8.2.1 Cost Sharing of Construction and Land Costs

As discussed, the non-Federal Sponsor in order to comply with a condition of the purchase of the Winsberg Farm property had to initiate construction of the project by December 2003 or the property reverted to the Winsbergs. Therefore, the non-Federal sponsor has completed construction of part of the project (Phase 1). The non-Federal sponsor will be eligible for credit for this work completed before a PCA was executed for the Project if the work is determined by the Secretary of the Army to be necessary and integral to the Project and to have been constructed for a reasonable cost. Additionally, the work must meet Federal standards and the costs must be reasonable, necessary, auditable and allocable. Any in-kind credit provided is limited to the non-Federal share of the Project and can not result in a reimbursement. Table 8-1 shows the estimated total project cost with a break out of the estimated cost sharing for each partner. Table 8-2 is an estimate of the amount of funds the non-Federal sponsor has already spent in the construction of Phase 1 of the project.

TABLE 8-1: ESTIMATED COSTS FOR WINSBERG FARMS WETLAND WITH COST SHARE

Work Phase	Total	USACE	PBCWMD
PMP	$59,620	$29,810	$29,810
PIR	$2,298,203	$1,149,102	$1,149,102
P&S	$850,000	$425,000	$425,000
Real Estate	$2,647,774	$57,000	$2,590,774
*Construction 1A [1](Boardwalk, *Interpretive Center, *Parking Lot -- Phase 1)	$4,508,149	$1,462,720	$3,045,429
*Construction 1B (Wetlands Phase 1)	$3,988,604	$1,994,302	$1,994,302
Construction 2 (Wetlands Phase 2)	$4,783,000	$2,391,500	$2,391,500
Total Cost/Partner		$7,509,434	$11,625,917
Total Cost of Project	$19,135,351		

* Estimated Costs for Winsberg Farm Wetland Assuming Cost Share Approved in Accordance With USACE Policies

* These features of the TSP were constructed by the non-federal sponsor, prior to execution of the PCA for the project.

[1] The recreation cost will be limited to 10% of the total Federal cost

TABLE 8-2: ESTIMATED PROJECT COSTS POTENTIALLY REIMBURSABLE TO THE SPONSOR FOR WORK COMPLETED IN CONSTRUCTING PHASE 1

	Total Project Costs	Sponsor's Actual Cost for Constructing Phase 1
Restoration costs	$14,627,201	
50% total Restoration costs	$7,313,100	
Sponsors sunk Construction Costs		$4,783,000
Sponsor's sunk PIR Cost		$960,000
Sponsor's Land Cost-172/175 acre value*		$2,546,360
Sponsor' Total Restoration Contribution		$8,289,360
Recreational Costs	$4,508,149	
Limits of Federal Participation	$1,462,720	
Sponsor sunk Construction Cost		$4,508,149
Sponsor Separable land value *for parking lot		$44,413
Sponsor's Total Recreational Contribution		$4,552,562
Sponsor's Total Project Contribution		$12,841,922
Total Project Cost	$19,135,350	

8.2.2 Cost Sharing of Operations and Maintenance

Section 601(e)(1) of WRDA 2000 specifies that operations and maintenance of authorized CERP projects may be cost shared equally by the federal government and the non-federal sponsor. Consistent with the provisions of Section 601(e)(4) of WRDA 2000, it is appropriate for the OMMRR&R associated with this plan to be shared equally between the federal government and the non-federal local sponsor.

8.3 PROJECT OPERATIONS

The Winsberg Farm Project was designed to use treated wastewater to create wetlands and fish and wildlife habitat in an urbanized environment and to reduce the amount of treated wastewater that is being permanently lost from the regional water management system through deep well injection by using it to hydrate constructed wetlands, thus returning the water to the natural environment. Treated wastewater will be pumped from the Southern Region Water Reclamation Facility (SRWRF) into Phase 1 Wetland of the Winsberg Farm Wetland Restoration Project to hydrate the wetlands; as the flow passes through Phase 1 Wetland it will enter Phase 2 Wetland and percolate into the ground.

Water flows during the startup phase will be controlled to maintain optimal soil moisture. The effluent pump station, which is located at the SRWRF plant facility, will discharge approximately 3 MGD (4.6 cfs) to ensure that the cell soils are at least kept inundated. The water depths will be maintained shallow, less than 6 inches. The wetland water levels will be maintained at an optimum water level between 19.5 ft and 19.75 ft for sufficient vegetation growth; with normal pool elevation not to exceed 20.0 ft.

Under normal operations, highly treated wastewater from the SRWRF is pumped to Phase 1 Wetland through the Site 3 DIP Pump Station. The Cell No. 1 and No. 2 Flow Control Structures will be adjusted to allow flows from Phase 1 Wetland to enter Phase 2 Wetland. The normal operating pool elevation is not to exceed 20.0 ft; when necessary, the existing and future 15-HP recirculation pumps will be used to prevent stagnation in Phase 1 Wetland and Phase 2 Wetland.

When the maximum pool elevation (21.0 ft) is reached, Site 3 DIP Pump Station will cease to deliver flow to the wetlands and excess flows will be sent via RTU #2 to deep well injection.

8.4 PROJECT ASSURANCES

As a result of laws and regulations passed by the Federal government and the state of Florida, Comprehensive Everglades Restoration Plan (CERP) Project Implementation Reports are required to provide that certain assurances are adequately addressed by the project being recommended for approval and implementation. The following sections summarize the Federal project-specific assurance and Savings Clause requirements and the evaluations performed to address those requirements. The Winsberg Farm Wetlands Restoration Project is a small project and will have negligible impact outside of the project footprint. See more detailed discussion in **Annex C** - Analysis Required by Federal and State Law.

8.4.1 Level of Service for Flood Protection

The Winsberg Farm project will not adversely impact the existing level of flood protection. Water discharged onto the project site is retained on the project, evaporates, is utilized by plants via transpiration, or percolates into the surficial aquifer in the vicinity of the project. Existing local drainage district canals provide drainage, water supply, and flood protection adjacent to the project site. **Annex C** contains more detailed discussion of the Project Assurances - Level of Service for Flood Protection

The Winsberg Farm TSP is expected to have no adverse or significant impacts to any system outside its local aquifer system. The average daily flow due to the TSP on an annual basis is estimated to be 3-5 MGD per day or 4.6-7.7 cfs. About 50-75 percent of this amount of water would be lost due to evapo-transpiration (ET). The remainder will percolate into the surficial aquifer, which will be negligible when compared to design flow rates of the adjacent LWDD L-29 and L-30 canals, which are roughly 100 cfs and 400-500 cfs respectively.

The average existing ground elevation is about 19.5 feet. The interior of the restoration area will be graded down to elevation 19.0 feet. The normal water level in the wet land restoration area will be about 19.5 feet with a maximum water level of 21 feet. The embankment surrounding the wetland area will be at elevation 26.5 feet or about 7 feet high. The embankment side slopes will be 1V on 3H with 10 foot wide crest. A 3 foot high, 5 foot wide containment berm will also surround the area. The embankment will consist of compacted silty sand. Based on this design creating a maximum differential head of only 3 feet, seepage beyond the containment berm will not be a problem and a detailed seepage analysis was not performed.

8.4.2 Effects on Water Supply for Existing Legal Sources

No existing legal sources of water will be eliminated or transferred by the Winsberg Farm project. See the discussion of Level of Service for Flood Protection above.

Because the Winsberg Farm Wetlands Restoration Project uses very small volumes of treated reclaimed wastewater, and wastewater is not part of the current Pre-CERP Baseline as it is disposed of through deep-well injection, and there is no planned discharge to surface water from the wetlands, it was determined that no additional hydrologic modeling was needed to determine that the project has no measurable impact on existing legal sources of water.

8.4.3 Identification of Water Made Available for the Natural System

Water made available by the Winsberg Farm Wetlands Restoration project includes both beneficial water for the natural system and water for other water related needs.

For the reasons listed above in Section 8.4.2, it was determined that no modeling was needed to determine that the project has no measurable system-wide effect. The only additional water made available for the natural system is that which is discharged to the created wetlands.

The Winsberg Farm Wetlands Restoration project is hydrologically separate and therefore does not make any additional beneficial water available for the natural system in Loxahatchee National Wildlife Refuge (WCA-1), WCA-2A, WCA-2B, WCA-3A, WCA-3B, Everglades National Park, and the WCA 3A/3B Seepage Management Area. .

Water made available as a result of the project features is determined by comparing the Existing Conditions with the Winsberg Farm Wetlands Restoration Project area. The amount of water diverted from the Palm Beach County Southern Regional Reuse Facility needed to maintain a minimum of 1 foot of water over the entire 114 acre wetland is the quantity of water to be reserved or allocated for this project. This water will be made available for fish and wildlife habitat. An allocation will be effectuated by the operating the project in accordance with the project operating manual.

The estimated flow needed for the project is 5 MGD. The water will be returned to the regional aquifer through percolation that would otherwise be lost through deep-well injection. All water added to the site will either percolate into the surficial aquifer or evaporate. To specifically estimate how much is added to the surficial aquifer, it will be assumed that 25 percent of the water added to the site will recharge the aquifer. The remaining 75 percent will evaporate and will not be returned to the regional aquifer. This will make 1.25 MGD of water available to the local aquifer for consumptive use and to protect the aquifer from salt water intrusion.

The non-Federal Sponsor will have to comply with the Water reservation requirement and it will be done in accordance with Florida Statute, and will be done prior to signing a PCA.

8.5 PROJECT MONITORING PLAN

The Project Monitoring Plan is in **Annex E.** Responsibility for the design and implementation of system-wide monitoring is in the hands of RECOVER, while the design and implementation of monitoring to determine local effects and

project performance is the responsibility of the Winsberg Farm PDT. To implement the system-wide program, RECOVER has developed the CERP Monitoring and Assessment Plan (MAP). However, the MAP does not specifically cover the Winsberg project area. As a result, the RECOVER system-wide monitoring plan was not available to be referenced for development of the project-specific plan. Consequently, the local project monitoring plan will be based upon the monitoring scheme established as part of a State of Florida Domestic Wastewater Facility Permit (No. FLA041424). Project-specific monitoring will be coordinated with Florida DEP to ensure that measures and targets derived from the permit by the project team are consistent with system-wide measures, and that duplication of effort is avoided. The Winsberg Farm Water Quality Monitoring Plan will utilize the results of pre-existent, routine Palm Beach County monitoring efforts within the project area of Winsberg Farm whenever possible.

8.5.1 Ground Water Monitoring

Six existing monitoring wells, as shown in **Table E-1** of **Annex E**, will be sampled in accordance with the monitoring frequencies specified in Permit Condition III.12 for the Winsberg Farm portion of Reuse System R-002. For the Winsberg Farm Wetlands (Phase I), monthly sampling must be reasonably spaced to be representative of potentially changing conditions. The following parameters shown in **Table 8-3** shall be analyzed for each of the monitoring wells (except background wells) identified in Permit Condition III.11.

TABLE 8-3: MONITORING WELL PARAMETERS

Parameter	Compliance Well Limit	Units	Sample Type	Monitoring Frequency
Water Level Relative to MSL	Report	FEET	In-situ	Note 1 below
Nitrogen, Nitrate, Total (as N)	10	MG/L	Grab	Note 1 below
Solids, Total Dissolved	500	MG/L	Grab	Note 1 below
Arsenic, Total Recoverable	50	UG/L	Grab	Note 1 below
Cadmium, Total Recoverable	5	UG/L	Grab	Note 1 below
Chloride (as Cl)	250	MG/L	Grab	Note 1 below
Chromium, Total Recoverable	100	UG/L	Grab	Note 1 below
Lead, Total Recoverable	15	UG/L	Grab	Note 1 below
pH	6.5-8.5	SU	In-situ	Note 1 below
Sulfate, Total	250	MG/L	Grab	Note 1 below
Coliform, total	4	#/100ML	Grab	Note 1 below
Trihalomethanes, Total	80	UG/L	Grab	Note 1 below
Nitrogen, Total (as N)	Report	MG/L	Grab	Note 1 below
Phosphorus, Total (as P)	Report	MG/L	Grab	Note 1 below

Note: The permittee shall monitor the above parameters monthly for the first year of this permit issuance, except during the first two months of the wetland operation during which the permittee shall monitor the above parameters biweekly. After the first year of monitoring the above parameters, the monitoring frequencies will be reduced to quarterly unless there is an objection from FDEP.

8.5.2 Vegetation Monitoring

Planting and vegetation maintenance will initially be the responsibility of the contractor (planting subcontractor) until a satisfactory level of plant survival is attained. Continuing plant growth maintenance will be the responsibility of the PBCWUD and aquatic vendor.

See **Table 8-4** for an estimate of the number of plants for each phase and planting zone.

TABLE 8-4: ESTIMATE OF NUMBER OF PLANTS BY PHASE AND PLANTING ZONE

	Phase 1 (80 Acres)	Phase 2 (45 Acres)	Total
Deep Zones	30,605	17,215	47,820
Marsh Zones	392,232	219,649	611,881
Transition/Upland Zones	3,125	1,750	4,875
Total Plants	425,962	238,614	664,576

In **Annex E, Table E-4** is taken from the CH2MHILL, August 2001, contract document. It provides planting details for the first part (Phase 1 – 80 acres) of the project that has been constructed by the Palm Beach County Water Utilities Division. The same planting species, combination and spacing will be used in the 45 acres of Phase 2 of the project.

8.5.3 Field Sampling

Field sampling will be conducted for six years following initial wetland planting to determine the success of the established wetlands. The sampling shall be conducted according to the following schedule:

- Start upon completion of plantings
- Follow-up one month after complete inundation of the wetland
- Quarterly thereafter for one year
- Bi-annually (every six months) for the next five years (include dry season and wet season)

8.5.4 Wildlife Surveys

Wildlife surveys will be conducted from the perimeter of the wetland to document wildlife abundance, species diversity, and nesting activity and recommended in the Draft USFWS Coordination Act Report. Surveys will consist

of half-day events scheduled to coincide with the vegetation monitoring described above. Reports will be submitted to USACE within 60 days of the monitoring event. USACE, in turn, will make annual reports to the USFWS.

8.6 COMPLIANCE WITH FLORIDA STATUTES

Compliance with State water quality requirements is discussed in **Appendix C**, Section C-4.

Florida Statute Section 373.1501 requires efficient and effective permitting of project components, taking into account all other statutory responsibilities the department and the South Florida Water Management District are required to consider. This requirement has been met by Palm Beach County through their obtaining a FDEP water quality permit for Phase 1 of the Winsberg Farm project.

8.7 COMPLIANCE WITH FEDERAL LAWS, STATUTES AND EXECUTIVE ORDERS

Annex B contains a detailed matrix of the project compliance status with Federal laws, statutes and executive orders. Full compliance is expected for each upon coordination of the final PIR/EA. However, some were not applicable to this project.

8.8 VIEWS OF NON-FEDERAL SPONSOR

The non-federal sponsor, Palm Beach County, Florida is in full support of this project. As discussed throughout this report, this project is so important to Palm Beach County, Florida that it has already constructed Phase 1 of the project. This consists of 72 acres of wetland along with all the recreation features. The non-federal sponsor's letter of intent will be submitted and included in the final PIR.

SECTION 9
*SUMMARY OF COORDINATION, PUBLIC VIEWS, AND COMMENTS

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9.0 SUMMARY OF COORDINATION, PUBLIC VIEWS AND COMMENTS

The two meetings of the full Project Delivery Team (PDT) held to date were both open to the public, with interested citizens from the local community attending. The meetings were held at the Palm Beach County Southern Region Water Reclamation Facility (SRWRF), which is located adjacent to the Winsberg Farm property. The PDT meetings were held March 8, 2002 and January 23, 2003. A number of other agencies have taken part in the PDT and National Environmental Policy Act (NEPA) scoping process.

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SECTION 10
RECOMMENDATIONS

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CENTRAL AND SOUTH FLORIDA PROJECT
WINSBERG FARM WETLANDS RESTORATION
PROJECT IMPLEMENTATION REPORT

10.0 RECOMMENDATIONS (BY USACE JACKSONVILLE DISTRICT ENGINEER PAUL GROSSKRUGER)

The Winsberg Farm project is a component of the Comprehensive Everglades Restoration Plan (CERP). The non-federal sponsor for this project is the Palm Beach County (Florida) Water Utility District. Consistent with the original purpose of the project as presented in the 1999 Comprehensive Review Study Report, I am recommending a plan designed to use treated wastewater to create constructed wetlands for the purposes of increasing the spatial extent of fish and wildlife habitat and increasing the amount of water available in the natural system. The source of the treated wastewater is a nearby wastewater treatment facility operated by the non-federal sponsor. Previously, treated wastewater generated at the existing wastewater treatment plan was disposed via deep-well injection An ancillary component of the project is a recreation plan consisting of an environmental education center, as well as a boardwalk to provide wetland access. The Winsberg Farm project is one of the CERP projects within the programmatic authority provided by Congress in Section 601(c) of Water Resources Development Act (WRDA) 2000, Public Law 106-541.

This project involves creation of 114 acres of wetland habitat in two phases. Phase 1 has already been constructed by the non-federal sponsor and is operational. The design and operational plan for this project is based on a similar successful existing project (Wakodahatchee Wetlands) also constructed and operated by the non-federal sponsor. The 114-acre vegetated wetland will provide habitat for small fish, many aquatic birds, and other wildlife species including a number of threatened and endangered species. The project will result in 5 million gallons per day of treated waste waster being reclaimed and returned to the natural environment rather than permanently lost from the regional water management system through deep will injection. Recreation features will provide access for fish and wildlife observation and include interactive exhibits and educational information.

Therefore, I recommend that the Winsberg Farm Project, as described in this section of the report, entitled the Selected Plan (Section 6), be authorized with such modifications thereof as, at the discretion of the Chief of Engineers, may be advisable for construction. The total estimated Project cost is $19,135,351 with an estimated federal cost of $7,509,434 and an estimated non-federal cost of $11,625,917. The total recreation cost is $4,508,150. The non-Federal cost of

recreation is $3,045,429, and the Federal cost of recreation is $1,462,720 The estimated total annual cost of operation, maintenance, repair, rehabilitation and replacement is $140,000 with an estimated Federal annual cost of $70,000 and an estimated non-Federal cost of $70,000. The non-Federal sponsor has constructed Phase 1 of the project in advance of entering into a project cooperation agreement due to its commitments with the acquisition of the lands for the Project. I recommend that the non-Federal sponsor receive in-kind credit towards its cost sharing responsibilities for the Project consistent with the provisions of Section 601(e)(5)(B) of the Water Resources Development Act of 2000, Public Law, as amended by Section 6004 of the Water Resources Development Act of 2007, Public Law, subject to the required determinations that the work performed is necessary and integral to the Project and for a reasonable cost. Additionally, the work must meet Federal standards and the costs must be reasonable, necessary, auditable and allocable. Any in-kind credit is limited to the non-Federal share of the Project and can not result in a reimbursement.

The above recommendations are made with the provision that the Non-Federal Sponsor and the Secretary of the Army shall enter into a binding agreement defining the terms and conditions of cooperation for implementing the Project, and that the Non-Federal Sponsor agrees to perform the following items of local cooperation:

a) Provide 50 percent of total project restoration costs consistent with the provisions of Section 601(e) of the Water Resources Development Act of 2000, including authority to perform design and construction of Project features consistent with federal law and regulation and 50 percent of total project recreation cost subject to the U.S. Army Corps of Engineers recreational cost sharing policy limit of 10 percent of the Federal cost for restoration feature project cost;

b) Provide all lands, easements and rights-of-way, including suitable borrow and dredged or excavated material disposal areas, and perform or assure the performance of all relocations determined necessary for the construction, operation, maintenance, repair, replacement and rehabilitation of the Project with valuation being consistent with the following:

    1. If the lands, easements and right-of-way were acquired prior to execution of the Project Cooperation Agreement, the creditable value shall be their purchase price, subject to a determination of reasonableness where appropriate, together with their reasonable and necessary incidental costs of acquisition.

2. The value of lands, easements, or rights-of-way acquired by the non-Federal Sponsor after the effective date of the Project Cooperation Agreement executed for this project shall be the fair market value of such real property interests at the time the interests are acquired, together with the reasonable and necessary incidental costs of acquisition;

c) Provide or pay to the government the cost of providing all retaining dikes, waste weirs, bulkheads and embankments, including all monitoring features and stilling basins, that may be required at any dredged or excavated material disposal areas required for the construction, operation and maintenance of the Project;

d) Give the government a right to enter, at reasonable times and in a reasonable manner, upon land that the Non-Federal Sponsor owns or controls for access to the Project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing or rehabilitating the Project;

e) Assume responsibility for operating, maintaining, repairing, replacing and rehabilitating (OMRR&R) the restoration features of the Project or completed functional portions of restoration features of the Project, and in a manner compatible with the Project's authorized purposes and in accordance with applicable Federal and State laws and specific directions prescribed in the OMRR&R manuals and any subsequent amendments thereto. Cost sharing for the OMRR&R of the ecosystem restoration features will be in accordance with Section 601 of WRDA 2000:

(e) COST SHARING.-

(4) OPERATION AND MAINTENANCE.- Notwithstanding section 528(e)(3) of the Water Resources Development Act of 1996 (110 Stat. 3770), the Non-Federal Sponsor shall be responsible for 50 percent of the cost of operation, maintenance, repair, replacement, and rehabilitation activities authorized under this section…

f) The Non-Federal Sponsor shall operate, maintain, repair, replace and rehabilitate the recreational features of the Project with responsibility for 100 percent of the cost;

g) Unless otherwise provided for in the statutory authorization for this Project, comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, and Section 103 of the WRDA of 1986, Public Law 99-662, as amended which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable

element thereof, until the Non-Federal Sponsor has entered into a written agreement to furnish its required cooperation for the Project or separable element;

h) Hold and save the government free from all damages arising from the construction, operation, maintenance, repair, replacement and rehabilitation of the Project and any project-related betterments, except for damages due to the fault or negligence of the government or the government's contractors;

i) Keep and maintain books, records, documents and other evidence pertaining to costs and expenses incurred pursuant to the Project to the extent and in such detail as will properly reflect total Project costs;

j) Perform, or cause to be performed, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601-9675, that may exist in, on, or under lands, easements or rights-of-way necessary for the construction, operation and maintenance of the Project; except that the Non-Federal Sponsor shall not perform such investigations on lands, easements, right-of-way that the Government determines to be subject to navigation servitude without prior specific written direction by the Government;

k) Assume complete financial responsibility for all necessary cleanup and response costs of any CERCLA-regulated materials located in, on or under lands, easements or rights-of-way that the government determines necessary for construction, operation or maintenance;

l) As between the government and the Non-Federal Sponsor, the Non-Federal Sponsor shall be considered the operator of the Project for the purposes of CERCLA liability. To the maximum extent practicable, the Non-Federal Sponsor shall operate, maintain, repair, replace and rehabilitate the Project in a manner that will not cause liability to arise under CERCLA;

m) Prevent obstructions of, or encroachments on, the Project (including prescribing and enforcing regulations to prevent such obstruction or encroachments) which might reduce ecosystem restoration and recreation benefits, hinder operation and maintenance, or interfere with the Project's proper function, such as new developments on project lands or the addition of facilities which would degrade project benefits;

n) Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and Uniform Regulations contained in 49 CFR, Part 24, in acquiring lands, easements, and rights-of-way, and performing relocations for construction, O&M of the Project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act;

o) Comply with all applicable Federal and State laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, PL 88-352 (42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army;" and all applicable federal labor standards requirements including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 [revising, codifying and enacting without substantive change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a et seq.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 et seq.) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c);

p) Comply with Section 106 of the National Historic Preservation Act in completion of consultation with the Florida State Historic Preservation Officer and as necessary the Advisory Council on Historic Preservation prior to construction as part of the Pre-construction Engineering Design phase of the Project;

q) Provide 50 percent of that portion of total cultural resource preservation mitigation and data recovery costs attributable to the Project that are in excess of one percent of the total amount authorized to be appropriated for the Project;

r) Do not use Federal funds to meet the Non-Federal Sponsor's share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is expressly authorized and in accordance with Section 601(e) of WRDA 2000.

s) The Non-Federal Sponsor shall maintain an appropriate quantity, quality, timing, and distribution of water to ensure the restoration and preservation of the natural system for so long as the Project remains authorized. This flow of water shall be consistent with the restoration goals of the Comprehensive Plan and meet all applicable water quality standards.

The Non-Federal Sponsor shall:

1. Ensure, through appropriate and legally enforceable means available under Florida law, that the flow of water, which this Project Implementation Report has identified was available to the natural system on the date of enactment of WRDA 2000 and beneficial to the natural system, will be available for the natural system at the time the project becomes operational and will remain available for so long as the Project remains authorized.

2. Prior to the execution of the Project Cooperation Agreement, reserve the additional water that will be made available by implementation of the project and that is necessary for the restoration and preservation of the natural system.

3. After the Project Cooperation Agreement is signed, make such adjustments to any reservation of water for this Project, that later information, science, or analyses shows are necessary for the restoration and preservation of the natural system.

4. Provide the Government with written certification that the requirements of subparagraphs 1 and 2 of this section have been fulfilled.

5. For so long as the Project remains authorized, notify the Secretary of the Army should any change be made in the reservation of water or other legally enforceable means of protecting water and consult with the Government, so that the Government may verify that the changed reservation or legally enforceable means of protecting water continues to ensure that the appropriate quantity, quality, timing, and distribution of water is dedicated and managed for the restoration and preservation of the natural system. Any change to a reservation of water for this Project shall require an amendment to the Project Cooperation Agreement.

The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to Congress as proposals for authorization and implementation funding. However, prior to

transmittal to Congress, the Sponsor, State, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

_____ _____

Paul Grosskruger **Date**
Colonel, U.S. Army
District Engineer

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SECTION 11
*LIST OF REPORT PREPARERS

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11.0 LIST OF REPORT PREPARERS

11.1 LIST OF REPORT PREPARERS

TABLE 11-1: PREPARERS OF PROJECT IMPLEMENTATION PREPORT

Preparer	Agency	Discipline/Expertise	Contribution
Bill Gallagher	USACE	Water Resource Planner	Plan Formulation, Planning Technical Lead
Ernie Clark	USACE	Biologist	NEPA and Environmental Technical Lead
Carrie Bond	USACE	Biologist	NEPA, Monitoring Plan
Mark White	USACE	Biologist	Water Quality, Monitoring Plan
Peter Besrutschko	USACE	Biologist	Water Quality, Monitoring Plan
Ed Brown	USACE	Environmental Engineer	Water Quality
Kevin Wittmann	USACE	Economist	Economic Analysis
Martin Falmlen	USACE	Engineer	Engineering Technical Lead
Robert Medlock	USACE	Civil Engineer	Cost Estimates
Ginevra Hightower	UASCE	Civil Engineer	Cost Estimates
Tracy Leeser	USACE	Civil Engineer	Cost Estimates
Emily Calla	USACE	Civil Engineer	Operating Manual
Logan Wilkinson	USACE	Civil Engineer	Operating Manual, Monitoring Plan
Tony Ayuso	USACE	Real Estate	Real Estate
Paul Stevenson	USACE	Landscape Architect	Recreation Appendix
Sam Honeycutt	USACE	Geotechnical Engineer	Geotechnical Analysis
Jose Lizarribar	USACE	Civil Engineer	Design
Frank Metzler	EPJV (contractor)	Senior Project Manager	Report Preparation
Mariely Morales	EPJV (contractor)	Associate Project Manager	Report Preparation
Barbara Cintron	USACE	Supervisory Biologist	Review
Eric Bush	USACE	Supervisory Biologist	Review

External ITR Team			
George Sauls	USACE	Philadelphia District	H&H
Leigh Skaggs	USACE	IWR	Economics
Rick Thomas	USACE	Savannah District	Real Estate
Richard Lewis	USACE	Wilmington District	Plan Formulation
Stacy Samuelson	USACE	Wilmington District	NEPA
Charles Harbin	USACE	Wilmington District	Engineering Design
Ann Hinds	USACE	Wilmington District	Geotechnical Review
Jeff Fresner	USACE	Wilmington District	Cost Engineering

SECTION 12
*INDEX

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12.0 INDEX

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SECTION 13
*GLOSSARY OF TERMS

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13.0 GLOSSARY OF TERMS

A

Acre – Area of land equal to 43,560 square feet. In International System (S.I.) metric system, one acre is equal to 4,046.9 square meters or 2.471 hectares.

Acre-Foot – The quantity of water required to cover one acre to a depth of one foot. Equal to 43,560 cubic feet (1,233.5 cubic meters).

Action Plan – A plan that describes what needs to be done and when it needs to be completed.

Activity – A specific project task that requires resources and time to complete.

Adaptive Assessment – A process for learning and incorporating new information into the planning and evaluation phases of the restoration program. This process ensures that the scientific information produced for this effort is converted into products that are continuously used in management decision-making.

Adverse Impact – The detrimental effect of an environmental change relative to desired or baseline conditions.

Affected Environment – Existing biological, physical, social and economic conditions of an area subject to change, directly or indirectly, as a result of a proposed human action.

Air Quality – Measure of health-related and visual characteristics of the air, often derived from quantitative measurements of the concentrations of specific injurious or contaminating substances.

Ameliorate – To improve.

Appurtenant – Auxiliary or accessory.

Aquatic – Consisting of, relating to, or being in water; living or growing in, on or near the water; or taking place in or on the water.

Aquifer – An underground geologic formation, a bed or layer of earth, gravel or porous stone, that yields water or in which water can be stored.

Authorization – An act by the Congress of the United States, which authorizes use of public funds to carry out a prescribed action.

B

Baseline – The initial approved plan for schedule, cost or performance management, plus or minus approved changes, to which deviations will be compared as the project proceeds.

Best Management Practices (BMPs) – The best available land, industrial and waste management techniques or processes that reduce pollutant loadings from land use or industry, or which optimize water use.

Biodiversity – Abundance and variety of living organisms within an area.

Biomass – The total number of living organisms in a particular area.

Biota – The plant and animal life of a region.

Borrow Canal – Canal or ditches where material excavated is used for earthen construction nearby. Also, typically denotes a canal with no conveyance or water routing purpose.

C

Canal – A human-made waterway that is used for draining or irrigating land or for navigation by boat.

Candidate Species – Plant or animal species not yet officially listed as threatened or endangered, but which is undergoing status review by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service.

Categorical Exclusion – Occurs when a project will not have a significant impact on the environment or natural resources.

Central and Southern Florida Project (C&SF) – A multi-purpose project, first authorized by Congress in 1948, which provides flood control, water supply protection, water quality protection, and natural resource protection.

Channel – Natural or artificial water course, with a definite bed and banks to confine and conduct continuously or periodically flowing water.

Coastal Ridge – Area of land bordering the coast whose topography is elevated higher than land further inland.

Coliforms – Aerobic bacteria found in the colon.

Comprehensive Everglades Restoration Plan (CERP) – The plan for the restoration of the greater Florida Everglades which promotes water supply and flood protection needs in the urban and agricultural regions of South Florida.

Comprehensive Plan – See Comprehensive Everglades Restoration Plan.

Contiguous – Adjacent

Control Structure – A human-created structure that regulates the flow of waters or the level of waters.

Conveyance Capacity – The rate at which water can be transported by a canal, aqueduct or ditch. In this document, conveyance capacity is generally measured in cubic feet per second (cfs).

Cost-Benefit Analysis – An analysis, often stated as a ratio, used to evaluate a proposed course of action.

Critical Habitat – A description, which may be contained in a Biological Opinion, of the specific areas with physical or biological features essential to the conservation of a listed species and which may require special management considerations or protection; these areas have been legally designated via *Federal Register* notices.

Cubic Feet Per Second (cfs) – A measure of the volume rate of water movement. As a rate of stream flow, a cubic foot of water passing a reference section in one second of time. One cubic foot per second equals 0.0283 meter per second (7.48 gallons per minute). One cubic foot per second flowing for 24 hours produces about two acre-feet.

Culvert – A concrete, metal or plastic pipe that transports water.

D

Discharge – The rate of water movement as volume per unit time, usually expressed as cubic feet per second.

Dissolved Oxygen (DO) – The concentration of oxygen dissolved in water, sometimes expressed as percent saturation, where saturation is the maximum amount of oxygen that theoretically can be dissolved in water at a given altitude and temperature.

Dry Season – Hydrologically, for South Florida the months associated with a lower incident of rainfall, specifically November through May.

Duration – The period of time during which a task occurs, in contrast to effort, which is the number of labor hours a task requires; duration establishes the schedule for a project, and effort establishes the labor costs.

E

Ecology – The science of the relationships between organisms and their environments, also called bionomics; or the relationship between organisms and their environment.

Ecosystem – A functional group of animal and plant species that operates in a unique setting that is mostly self-contained.

Effectiveness – A measure of the quality of attainment in meeting objectives; this is distinguished from efficiency, which is measured by the volume of output achieved for the input used.

Endangered Species – Any species or subspecies of bird, mammal, fish, amphibian, reptile or plant which is in serious danger of becoming extinct throughout all, or a significant portion of, its range. Federally endangered species are officially designated by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service and published in the *Federal Register*.

Enhancement – Measures which develop or improve the quality or quantity of existing conditions or resources beyond a condition or level that would have occurred without an action; i.e., beyond compensation.

Environmental and Economic Equity (EEE) – A program-level activity, referred to in early phases of the program as Socio-economic and Environmental Justice.

Environmental Consequences – The impacts to the Affected Environment that are expected from implementation of a given alternative.

Environmental Impact Statement (EIS) – An analysis required by the National Environmental Policy Act for all major federal actions, which evaluates the environmental risks of alternative actions.

Environmental Justice – A term used to describe any disproportionately high and adverse effects of federal-agency activities and programs on minority and low-income populations within a project area.

Evaluate – To appraise or determine the value of information, options or resources being provided to a project.

Evapotranspiration – The total water loss from soil.

Exacerbate – To irritate or aggravate.

Exotic Species – Introduced species not native to the environment where they are found.

F

Fallowed Land – Cultivated land that lies idle during a growing season.

Fauna – Animal life.

Feasibility Study – The second phase of a project. The purpose is to describe and evaluate alternative plans and fully describe recommended projects.

Federally Endangered Species – An endangered species which is officially designated by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service and published in the *Federal Register*.

Flood Control Storage Capacity – Reservoir capacity reserved for the purpose of regulating flood inflows to reduce flood damage downstream (compare with reservoir storage capacity).

Flora – Plant life.

Flow – The volume of water passing a given point per unit of time.

- **In-Stream Flow Requirements** – Amount of water flowing through a stream course needed to sustain in-stream values.
- **Minimum Flow** – Lowest flow in a specified period of time.
- **Peak Flow** – Maximum instantaneous flow in a specified period of time.

Flowage Easements – Easements acquired for the right to manipulate water levels in a certain area.

G

Geospatial Data – Information, which includes, but is not limited to, surveys, maps, aerial photography and aerial imagery, as well as biological, ecological and hydrological modeling coverage.

Goal – Something to be achieved. Goals can be established for outcomes (results) or outputs (efforts).

Groundwater – Water stored underground in pore spaces between rocks and in other alluvial materials, and in fractures of hard rock occurring in the saturated zone.

Groundwater Level – Refers to the water level in a well, and is defined as a measure of the hydraulic head in the aquifer system.

Groundwater Pumping – Quantity of water extracted from groundwater storage.

Groundwater Seepage – Groundwater flow in response to a hydraulic gradient.

Groundwater Table – The upper surface of the zone of saturation, except where the surface is formed by an impermeable body.

H

Habitat – Area where a plant or animal lives.

Habitat Fragmentation – The splitting of natural ecosystems into smaller, isolated units.

Hammock – Localized, thick stands of trees that can grow on natural rises of only a few inches in the land.

Hectare – A unit of measure in the metric system equal to 10,000 square meters or 2.47 acres.

Home Range – The area covered by the normal annual mobility of wildlife species.

Hydraulic Gradient – Denotes slope of watercourse, above or below ground water level. Typically defines energy loss or consumption in the conveyance process.

Hydraulic Head (Lift) – Denotes relative comparison of water stages for gravity flow. Pump stations generally provide lift or increased water level elevations.

Hydrologic Condition – The state of an area pertaining to the amount and form of water present; e.g., saturated ground (water table at surface), lake stage, and river flow rate.

Hydrologic Response – An observed decrease or increase of water in a particular area.

Hydrology – The scientific study of the properties, distribution and effects of water on the Earth's surface, in the soil and underlying rocks, and in the atmosphere.

Hydropattern – Refers to depth, as well as hydroperiod. Hydropatterns are best understood by a graphic depiction of water level (above, as well as below, the ground) through annual cycles.

Hydroperiod – For non-tidal wetlands, the average annual duration of flooding is called the hydroperiod, which is based only on the presence of surface water and not its depth.

I

Impoundment – An above-ground reservoir used to store water.

Independent Technical Review Team – A group autonomous of the Project Team established to conduct reviews to ensure that design products are consistent with established criteria, guidance, procedures and policies.

Indicator species – Organism, species or community which indicates presence of certain environmental conditions.

Invertebrate – A small animal that does not have a backbone. Examples include crayfish, insects and mollusks, which can be indicators of ecosystem status.

J

K

L

Lag – The amount of time after one task is started or completed before the next task can be started or completed.

Land Classification – An economic classification of variations in land reflecting its ability to sustain long-term agricultural production.

Levee – A human-created embankment that controls or confines water.

Littoral Zone – The shore of land surrounding a water body that is characterized by periodic inundation or partial saturation by water level. Typically defined by species of vegetation found.

Local Sponsor – The South Florida Water Management District

M

Macrophytes – Visible plants found in aquatic environments, including sawgrass, sedges and lilies.

Marsh – An area of low-lying wetland.

Master Program Management Plan (MPMP) – A document which describes the framework and processes to be used by USACE and the SFWMD for managing and monitoring implementation of the Comprehensive Everglades Restoration Plan.

MIKE SHE – An integrated, surface water/groundwater model which includes a module for estimating supplemental irrigation requirements based upon land use, soil type, crop type, rainfall and evapotranspiration.

Mitigation – To make less severe; to alleviate, diminish or lessen. One or all of the following may comprise mitigation: (1) avoiding an impact altogether by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of an action and its implementation; (3) rectifying an impact by repairing, rehabilitating or restoring the affected environment; (4) reducing or eliminating an impact over time by preservation and maintenance operations during the life of an action; and (5) compensating for an impact by replacing or providing substitute resources or environments.

Model – A tool used to mathematically represent a process which could be based upon empirical or mathematical functions. Models can be computer programs, spreadsheets or statistical analyses.

Monitoring – The capture, analysis and reporting of project performance, usually as compared to a plan.

Muck lands – Fertile soil containing putrid vegetative matter.

N

National Ambient Air Quality Standard – Standard air pollutant levels set forth by the Environmental Protection Agency (EPA) under the Clean Air Act.

Non-Attainment – Describes an area where air pollution levels persistently exceed the National Ambient Air Quality Standards (NAAQS).

O

Objective – A goal expressed in specific, directly measurable terms.

Off-Peak – Less-than-peak, design flow rate during storm runoff-producing events.

Other Program Element (OPE) – One of 12 components identified in the Comprehensive Plan which will be implemented through programs other than CERP, including the Critical Restoration Projects Authority, or which will be implemented with an appropriate local sponsor under separate Design Agreements and Project Management Plans.

Outreach – Proactive communication and productive involvement with the public to best meet the water resource needs of South Florida.

Overtopping-Oxygen Demand – The biological or chemical demand of dissolved oxygen in water. Required by biological processes for respiration.

P

Passive Water Treatment Mechanism – A method of surface water treatment by collecting water runoff in retention ponds or swale ditches.

Performance Measure – A desired result stated in quantifiable terms to allow for an assessment of how well the desired result has been achieved.

Periphyton – The biological community of microscopic plants and animals attached to surfaces in aquatic environments; e.g., algae.

Phosphorus (P) – Element or nutrient required for energy production in living organisms. Distributed into the environment mostly as phosphates by agricultural runoff (fertilizer) and life cycles. Frequently, the limiting factor for growth of microbes and plants.

Plan – See Comprehensive Everglades Restoration Plan.

Porosity – The amount of pore space.

Prime and Unique Farmlands – Land that has the best combination of physical and chemical characteristics for producing crops and/or specific high-value food (Farmland Protection Policy Act of 1991).

Program – A group of related projects managed in a coordinated manner; programs usually include an element of on-going activity.

Program Management – A structure and set of strategies to be used during the implementation phase that build upon interagency partnerships, implementation guidelines, and successful strategies developed during the Restudy's feasibility planning phase.

Programmatic Environmental Impact Statement (PEIS) – An environmental impact statement prepared prior to a federal agency's decision regarding a major program, plan or policy, which usually is broad in scope and followed by subsequently more narrowly focused National Environmental Policy Act compliance documents.

Programmatic Regulations – Section 601(h) of (Water Resources Development Act (WRDA) 2000 states that the overarching purpose of the Comprehensive Plan is the restoration, preservation and protection of the South Florida ecosystem while providing for the other water-related needs of the region, including water supply and flood protection. The purpose of the regulations is to ensure that CERP goals and objectives are achieved. The regulations will contain: (1) processes for the development of Project Implementation Reports, Project Cooperation Agreements, and operating manuals that ensure the goals and objectives of the Plan are achieved; (2) processes that ensure new scientific, technical or other information, such as that developed through adaptive management, that is integrated into Plan implementation; and (3) processes to establish interim goals to provide a means

by which the restoration success of the plan may be evaluated throughout the implementation process.

Project – A sequence of tasks with a beginning and end that uses time and resources to produce specific results. Each project has a specific, desired outcome, a deadline or target completion date, and a budget that limits the amount of resources that can be used to complete the project.

Project Cooperation Agreement (PCA) – A document that describes the roles and responsibilities of USACE and the SFWMD for real estate acquisition, construction, construction management, and operations and maintenance.

Project Team – An interdisciplinary group formed from the resources of the implementing agencies which develop the products necessary to deliver the project.

Project Duration – The time it takes to complete an entire project from starting the first task to finishing the last task.

Project Implementation Report (PIR) – A decision document that will bridge the gap between the conceptual designs contained in the Comprehensive Plan and the detailed design necessary to proceed to construction.

Project Management – A discipline of combining systems, techniques and people to complete a project within established goals of time, budget and quality.

Project Management Information System – A system used to chart activities and data, and to track progress and information flow in a project.

Project Management Plan (PMP) – A document which establishes the project's scope, schedule, costs, funding requirements and technical performance requirements, including the various functional area's performance and quality criteria that will be used to produce and deliver the products that comprise the project.

Project Manager – A person who takes overall responsibility for coordinating a project to ensure the desired result comes in on time and within budget.

Project Phase – A collection of logically related project activities, usually culminating in the completion of a major deliverable.

Proposed Action – Plan that a federal agency intends to implement or undertake and which is the subject of an environmental analysis. Usually, but not always, the proposed action is the agency's preferred alternative for a

project. The proposed action and all reasonable alternatives are evaluated against the no-action alternative.

Public Involvement – The process of obtaining citizen input into each stage of the development of planning documents. Required as a major input into any EIS.

Public Outreach – A program-level activity with the objectives of keeping the public informed on the status of the overall program and key issues associated with restoration implementation, and providing effective mechanisms for public participation in restoration plan development.

Pump Station – A human-constructed structure that uses pumps to transfer water from one location to another.

Q

Quality Assurance (QA) – The process of evaluating overall project performance on a regular basis to provide confidence that the project will satisfy relevant quality standards.

Quality Control (QC) – The process of monitoring specific project results to determine if they comply with relevant quality standards, and identifying means of eliminating causes of unsatisfactory performance.

R

Recharge – The process of water filling the voids in an aquifer, which causes the piezometric head or water table to rise in elevation.

Reconnaissance Study – The first phase of a project. It has four phases: (1) to define the problem, (2) assess sponsor's level of interest and support, (3) decide to progress to feasibility phase based on federal interest, and (4) estimate time and money to complete feasibility study.

Record of Decision – Concise, public, legal document which identifies and publicly and officially discloses the responsible official's decision on the alternative selected for implementation. It is prepared following completion of an Environmental Impact Statement.

Regional Water Supply Plan – Detailed water supply plan developed by the District under Ch. 373.0361, F.S.

Reservoir – Artificially impounded body of water.

Reservoir Storage Capacity – Reservoir capacity normally usable for storage and regulation of reservoir inflows to meet established reservoir operating requirements.

Flood Control Storage Capacity – Reservoir capacity reserved for the purpose of regulating flood inflows to reduce flood damage downstream.

Restoration – The recovery of a natural system's vitality and biological and hydrological integrity to the extent that the health and ecological functions are self-sustaining over time.

Restoration Coordination and Verification (RECOVER) – A program-level activity whose role is to organize and apply scientific and technical information in ways that are most effective in supporting the objectives of the Comprehensive Everglades Restoration Plan.

Restudy – Also known as the "Yellow Book", the Restudy is the Central and South Florida Project Comprehensive Review Study, authorized by the Water Resources Development Act of 1992, which examined the Central and Southern Project to determine the feasibility of modifying the project to restore the South Florida ecosystem and provide for other water-related needs of the region This resulted in The Final Integrated Feasibility Report and Programmatic Environmental Impact Statement, which was transmitted to Congress on July 1, 1999.

Risk Analysis – An evaluation of the feasibility or probability that the outcome of a project or policy will be the desired one; usually conducted to compare alternative scenarios, action plans or policies.

S

Scoping – The process of defining the scope of a study, primarily with respect to the issues, geographic area, and alternatives to be considered. The term is typically used in association with environmental documents prepared under the National Environmental Policy Act.

Scrub – A community dominated by pinewoods with a thick understory of oaks and saw palmetto, and which occupies well-drained, nutrient-poor, sandy soils.

Seepage – Water that escapes control through levees, canals or other holding or conveyance systems.

Semi-Volatile Organic Compounds (SVOCs) – A hydrocarbon that partially vaporizes when exposed to air, such as DDT and chlordane.

Sensitive Receptors – Specific areas within a project area that can be directly affected by project activities, such as noise levels and air contaminants.

Sheet Flow – Water movement as a broad front with shallow, uniform depth.

Slough – A depression associated with swamps and marshlands or part of a bayou, inlet or backwater; containing areas of slightly deeper water and a slow current; can be thought of as the broad, shallow rivers of the Everglades.

South Florida Ecosystem – An area consisting of the lands and waters within the boundary of the South Florida Water Management District, including the Everglades, Florida Keys and the contiguous, near-shore coastal waters of South Florida.

South Florida Water Management Model (SFWMM) – An integrated surface-water/groundwater model that simulates the hydrology and associated water management schemes in the majority of South Florida, using climatic data from January 1, 1965, through December 31, 1995. The model simulates the major components of the hydrologic cycle and the current and numerous proposed water-management control structures and associated operating rules. It also simulates current and proposed water-shortage policies for the different subregions in the system.

Spatial Extent – Area that is continuous without non-integrating internal barriers or land usage.

Spatially Variable – Not the same in all areas.

Specific Conductance – A measure of the electrical conductivity of dissolved ions in the water.

Spillway – Overflow structure of a dam.

Spoil Area – An area where dredged or excavated soil or rock material is deposited.

Stakeholders – People or organizations having a personal or enterprising interest in the results of a project, which may or may not be involved in completing the actual work on that project.

Stormwater – Surface water resulting from rainfall that does not percolate into the ground or evaporate.

Success Indicator – A subset of performance measures selected as an appropriate representation of overall performance.

Surficial Aquifer – An aquifer that is closest to the surface and unconfined. The water level of a surficial aquifer is typically associated with the groundwater table of an area.

Sustainability – The state of having met the needs of the present without endangering the ability of future generations to be able to meet their own needs.

Swamp – A generally wet, wooded area where standing water occurs for at least part of the year.

T

Threatened Species – Legal status afforded to plant or animals species that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range, as determined by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service.

Tiering – Procedure which allows an agency to avoid duplication of paperwork through incorporation by reference of the general discussions and relevant, specific discussions from an environmental impact statement (EIS) of broader scope into a subsequent EIS of narrower scope.

Trade-Off – Allowing one aspect of a project to change, usually for the worse, in return for another aspect of the project getting better.

Transmissivity – A measure of the amount of radiation propagated through a given medium.

Tributary – A stream feeding into a larger stream, canal or water body.

Trichloroethylene – A non-flammable liquid used as a solvent and in dry cleaning and removal of grease from metal.

U

V

Vinyl Chloride – A flammable gaseous carcinogenic compound used in making vinyl resins.

Volatile Organic Compounds (VOCs) – Any compound of carbon that is involved in atmospheric photochemical reactions, such as benzene, toluene and vinyl chloride.

W

Water Budget – An account of all water inflows, outflows and changes in storage for a pre-specified period of time.

Water Conservation Areas (WCAs) – Marshland areas that were designed for use as storage to prevent flooding, to irrigate agriculture and recharge well fields, and as input for agricultural and urban runoff. Water Conservation Areas (WCAs) 1, 2A, 2B, 3A and 3B comprise five surface-water management basins in the Everglades. Bounded by the Everglades Agricultural Area on the north and the Everglades National Park basin on the south, the WCAs are confined by levees and water-control structures that regulate inflows and outflows to each area.

Watershed – A region or area bounded peripherally by a water parting and draining ultimately to a particular watercourse or body of water.

Wetlands – Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.

Wet Season – Hydrologically, for South Florida the months associated with a higher-than-average incident of rainfall, specifically June through October.

Wildlife Corridor – A relatively wide pathway used by animals to transverse from one habitat arena to another.

Wildlife Habitat – An area that provides a water supply and vegetative habitat for wildlife.

X

Y

Yellow Book – See Restudy.

Z

SECTION 14
ACRONYMS

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14.0 ACRONYMS

A

AFB	Alternative Formulation Briefing
AGP	Algal Growth Potential
AID	Acme Improvement District
AIWW	Atlantic Intracoastal Waterway
ASA(CW)	Assistant Secretary of the Army for Civil Works
ASR	Aquifer Storage and Recovery
AST	Above-ground storage tanks
ASTM	American Society for Testing and Materials

B

BA	Biological Assessment
BC	Benefit Cost
BCR	Benefit Cost Ratio
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
BY	Budget Year

C

C	Canal
C&SF	Central and Southern Florida
CAA	Clean Air Act
CAR	Coordination Act Report
CBRA	Coastal Barrier Resources Act (COBRA)
CCMP	Comprehensive Conservation and Management Plan
CE/ICA	Cost Effectiveness/Incremental Coat Analysis
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERP	Comprehensive Everglades Restoration Plan
CESAJ	U.S. Army Corps of Engineers, Jacksonville District
CEQ	Council on Environmental Quality
CFS	Cubic Feet Per Second (cfs)
Co.	County
COD	Chemical Oxygen Demand
CPM	Critical Path Method
CWA	Clean Water Act (of 1977)
CY	Cubic yard
CZM	Coastal Zone Management

CZMA Coastal Zone Management Act

D

DA Department of the Army
DAR Defense Acquisition Regulations
DCE Design Construction Evaluation
DCT Design Coordination Team
DE District Engineer
DEIS Draft Environmental Impact Statement
DEP Department of Environmental Protection (Florida – FDEP)
DIP Ductile Iron Pipe
DO Dissolved Oxygen
DoD Department of Defense
DOD Dissolved Oxygen Demand
DOE Department of Energy
DOI Department of the Interior
DOJ Department of Justice
DOQQ Digital Oration Quarter Quadrangle
DOT Department of Transportation
DPR Detailed Project Report
DPS Detailed Project Study

E

E&D Engineering and Design
EA Environmental Assessment
EFH Essential Fish Habitat
EIS Environmental Impact Statement
EO Executive Order
EPA Environmental Protection Agency
ER Engineering Regulation
ESA Endangered Species Act
EWMA Everglades -- Francis S. Taylor Wildlife Management Area

F

FAC Florida Administrative Code
FAS Florida Aquifer System
FAQs Frequently Asked Questions
FDEP Florida Department of Environmental Protection
FC Flood Control
FCSA Feasibility Cost Sharing Agreement
FEIS Final Environmental Impact Statement

FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FIFR	Final Integrated Feasibility Report
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
FLUCCS	Florida Land Use/Land Cover Classification System
FMSF	Florida Master Site File
FNAI	Florida Natural Areas Inventory
FONSI	Finding of No Significant Impact
FPFWCD	Fort Pierce Farm Water Control District
FPL	Florida Power & Light
fps	Feet per second
F.S.	Florida Statutes
FSM	Feasibility Scoping Meeting
FWC	Florida Fish and Wildlife Conservation Commission
FWCA	Fish and Wildlife Coordination Act
FY	Fiscal Year

G

GIS	Geographical Information Systems
GM	Guidance Memorandum
GMS	Groundwater Modeling System
GSA	General Services Administration

H

H&H	Hydraulics and Hydrology
Hg	Mercury
HTRW	Hazardous, Toxic, Radioactive Wastes
HU	Habitat Units
HQ	Headquarters

I

ICA	Incremental Cost Analysis
IDC	Interest During Construction
IM	Information Management
ITR	Independent Technical Review
ITRT	Independent Technical Review Team
IWR	Institute for Water Resources

J

K

L

L	Levee
LEC	Lower East Coast of Florida
LERRDS	Lands, Easements, Rights-of-Way, Relocation, and Disposal Areas
LNWR	Loxahatchee National Wildlife Refuge
LWDD	Lake Worth Drainage District
LWID	Lake Worth Improvement District

M

MAD	Multi-Agency Design Team
MAP	Monitoring and Assessment Plan
MCACES	Microcomputer Aided Cost Engineering System
MFL	Minimum Flow and Levels
mgd	Million Gallons per Day
mg/l	Milligrams per Liter
MLW	Mean Low Water
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPMP	Master Program Management Plan
MSRP	Multi-Species Recovery Plan
MSSW	Management and Storage of Surface Water

N

NED	National Economic Development
NEPA	National Environmental Policy Act
NER	National Ecosystem Restoration
NGVD 29	National Geodetic Vertical Datum of 1929
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSID	North Springs Improvement District
NTU	Nephelometric Turbidity Units

O

OASA (CW)	Office of the Assistant Secretary of the Army for Civil Works
OMRR&R	Operation, Maintenance, Repair, Rehabilitation, Replacement
O&M	Operations and Maintenance

OFW Outstanding Florida Water
OMB Office of Management and Budget
OPE Other Program Element

P

P Phosphorus
P&G Principles and Guidelines
Pb Lead
PBCWUD Palm Beach County Water Utility District
PCA Project Cooperation Agreement
PCB Polychlorinated Biphenyls
PDT Project Delivery Team
PE Professional Engineer
PE&D Planning, Engineering and Design
PEIS Programmatic Environmental Impact Statement
PIR Project Implementation Report
PM Performance Measures
PMP Project Management Plan
ppb Parts Per Billion
ppt Parts Per Thousand
PRB Project/Program Review Board

Q

Q&A Question and Answer
QA Quality Assurance
QAQC Quality Assurance and Quality Control
QC Quality Control
QM Quality Management

R

RCRA Resource Conservation Recovery Act
RED Regional Economic Development
RECOVER Restoration, Coordination and Verification
RED Regional Economic Development Effects
Restudy C&SF Project Comprehensive Review Study
RET Regional Evaluation Team [subteam of RECOVER]
RIMS Regional Input-Output Modeling System
ROD Record of Decision
ROW Right of Way

S

S	Structure
SAD	South Atlantic Division
SAV	Submerged Aquatic Vegetation
SAS	Surficial Aquifer System
SCORP	Florida State Comprehensive Outdoor Recreation Plan
SFERTF	South Florida Ecosystem Restoration Task Force
SFWMD	South Florida Water Management District
SFWMM	South Florida Water Management Model
SHPO	State Historic Preservation Officer
SOP	Standard Operating Procedure
SR	State Road or State Route
SRWRF	Southern Region Water Reclamation Facility
STA	Stormwater Treatment Area

T

TBEL	Technology Based Effluent Limitations
TDS	Total Dissolved Solids
TDR	Transfer of Development Rights
TMDL	Total Minimum/Maximum Daily Load
TP	Total Phosphorus
TRP	Tentatively Recommended Plan

U

UIC	Underground Injection Control
US	United States
USACE	United States Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USWRC	U.S. Water Resources Council's Guidelines

V

VE	Value Engineering

W

WCA	Water Conservation Area
WPA	Water Preserve Areas
WQ	Water Quality

WQC Water Quality Certification
WQI Water Quality Index
WQBEL Water Quality Based Effluent Limitations
WRAC Water Resources Advisory Commission
WRAP Wetland Rapid Assessment Procedure
WRDA Water Resources Development Act
WS Water Supply

X

Y

Z

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SECTION 15
*REFERENCES

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